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UNODC Research

EXECUTIVE SUMMARY CONCLUSIONS AND POLICY IMPLICATIONS

WORLD DRUG REPORT 2018

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PREFACE

Both the range of drugs and drug markets are expanding and diversifying as never before. The findings of this year's *World Drug Report* make clear that the international community needs to step up its responses to cope with these challenges.

We are facing a potential supply-driven expansion of drug markets, with production of opium and manufacture of cocaine at the highest levels ever recorded. Markets for cocaine and methamphetamine are extending beyond their usual regions and, while drug trafficking online using the darknet continues to represent only a fraction of drug trafficking as a whole, it continues to grow rapidly, despite successes in shutting down popular trading platforms.

Non-medical use of prescription drugs has reached epidemic proportions in parts of the world. The opioid crisis in North America is rightly getting attention, and the international community has taken action. In March 2018, the Commission on Narcotic Drugs scheduled six analogues of fentanyl, including carfentanil, which are contributing to the deadly toll. This builds on the decision by the Commission at its sixtieth session, in 2017, to place two precursor chemicals used in the manufacture of fentanyl and an analogue under international control.

However, as this *World Drug Report* shows, the problems go far beyond the headlines. We need to raise the alarm about addiction to tramadol, rates of which are soaring in parts of Africa. Non-medical use of this opioid painkiller, which is not under international control, is also expanding in Asia. The impact on vulnerable populations is cause for serious concern, putting pressure on already strained health-care systems.

At the same time, more new psychoactive substances are being synthesized and more are available than ever, with increasing reports of associated harm and fatalities.

Drug treatment and health services continue to fall short: the number of people suffering from drug use disorders who are receiving treatment has remained low, just one in six. Some 450,000 people died in 2015 as a result of drug use. Of those deaths, 167,750 were a direct result of drug use disorders, in most cases involving opioids.

These threats to health and well-being, as well as to security, safety and sustainable development, demand an urgent response.

The outcome document of the special session of the General Assembly on the world drug problem held in 2016 contains more than 100 recommendations on promoting evidence-based prevention, care and other measures to address both supply and demand.

We need to do more to advance this consensus, increasing support to countries that need it most and improving international cooperation and law enforcement capacities to dismantle organized criminal groups and stop drug trafficking.

The United Nations Office on Drugs and Crime (UNODC) continues to work closely with its United Nations partners to assist countries in implementing the recommendations contained in the outcome document of the special session, in line with the international drug control conventions, human rights instruments and the 2030 Agenda for Sustainable Development.

In close cooperation with the World Health Organization, we are supporting the implementation of the *International Standards on Drug Use Prevention* and the international standards for the treatment of drug use disorders, as well as the guidelines on treatment and care for people with drug use disorders in contact with the criminal justice system.

The World Drug Report 2018 highlights the importance of gender- and age-sensitive drug policies, exploring the particular needs and challenges of women and young people. Moreover, it looks into

increased drug use among older people, a development requiring specific treatment and care.

UNODC is also working on the ground to promote balanced, comprehensive approaches. The Office has further enhanced its integrated support to Afghanistan and neighbouring regions to tackle record levels of opiate production and related security risks. We are supporting the Government of Colombia and the peace process with the Revolutionary Armed Forces of Colombia (FARC) through alternative development to provide licit livelihoods free from coca cultivation.

Furthermore, our Office continues to support efforts to improve the availability of controlled substances for medical and scientific purposes, while preventing misuse and diversion – a critical challenge if we want to help countries in Africa and other regions come to grips with the tramadol crisis.

Next year, the Commission on Narcotic Drugs will host a high-level ministerial segment on the 2019 target date of the 2009 Political Declaration and Plan of Action on International Cooperation towards an Integrated and Balanced Strategy to Counter the World Drug Problem. Preparations are under way. I urge the international community to take this opportunity to reinforce cooperation and agree upon effective solutions.

Yury Fedotov
Executive Director
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EXPLANATORY NOTES

The boundaries and names shown and the designations used on maps do not imply official endorsement or acceptance by the United Nations. A dotted line represents approximately the line of control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Disputed boundaries (China/India) are represented by cross-hatch owing to the difficulty of showing sufficient detail.

The designations employed and the presentation of the material in the *World Drug Report* do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities or concerning the delimitation of its frontiers or boundaries.

Countries and areas are referred to by the names that were in official use at the time the relevant data were collected.

All references to Kosovo in the *World Drug Report*, if any, should be understood to be in compliance with Security Council resolution 1244 (1999).

Since there is some scientific and legal ambiguity about the distinctions between "drug use", "drug misuse" and "drug abuse", the neutral terms "drug use" and "drug consumption" are used in the *World Drug Report*. The term "misuse" is used only to denote the non-medical use of prescription drugs.

All uses of the word "drug" in the *World Drug Report* refer to substances controlled under the international drug control conventions.

All analysis contained in the *World Drug Report* is based on the official data submitted by Member States to the United Nations Office on Drugs and Crime through the annual report questionnaire unless indicated otherwise.

The data on population used in the *World Drug Report* are taken from: *World Population Prospects: The 2017 Revision* (United Nations, Department of Economic and Social Affairs, Population Division).

References to dollars ($) are to United States dollars, unless otherwise stated.

References to tons are to metric tons, unless otherwise stated.

The following abbreviations have been used in the present booklet:

GHB	*gamma*-Hydroxybutyric acid
ha	hectares
LSD	Lysergic acid diethylamide
MDMA	3,4-Methylenedioxymethamphetamine
NPS	new psychoactive substances
PWID	people who inject drugs
UNODC	United Nations Office on Drugs and Crime
WHO	World Health Organization

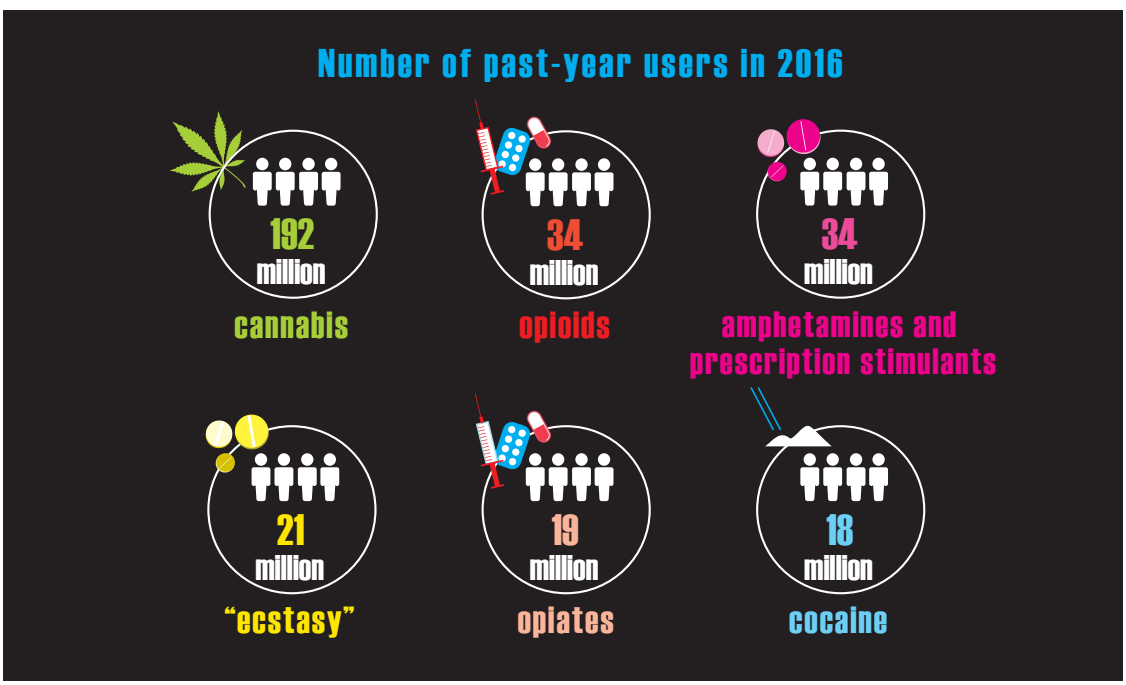
EXECUTIVE SUMMARY

About 275 million people worldwide, which is roughly 5.6 per cent of the global population aged 15–64 years, used drugs at least once during 2016. Some 31 million of people who use drugs suffer from drug use disorders, meaning that their drug use is harmful to the point where they may need treatment. Initial estimations suggest that, globally, 13.8 million young people aged 15–16 years used cannabis in the past year, equivalent to a rate of 5.6 per cent.

Roughly 450,000 people died as a result of drug use in 2015, according to WHO. Of those deaths, 167,750 were directly associated with drug use disorders (mainly overdoses). The rest were indirectly attributable to drug use and included deaths related to HIV and hepatitis C acquired through unsafe injecting practices.

Opioids continued to cause the most harm, accounting for 76 per cent of deaths where drug use disorders were implicated. PWID — some 10.6 million worldwide in 2016 — endure the greatest health risks. More than half of them live with hepatitis C, and one in eight live with HIV.

The headline figures for drug users have changed little in recent years, but this stability masks the striking ongoing changes in drug markets. Drugs such as heroin and cocaine that have been available for a long time increasingly coexist with NPS and there has been an increase in the non-medical use of prescription drugs (either diverted from licit channels or illicitly manufactured).The use of substances of unclear origin supplied through illicit channels that are sold as purported medicines but are destined for non-medical use is also on the increase. The range of substances and combinations available to users has never been wider.



LATEST TRENDS

Record levels of plant-based drug production have been reached

Afghan opium poppy cultivation drives record opiate production

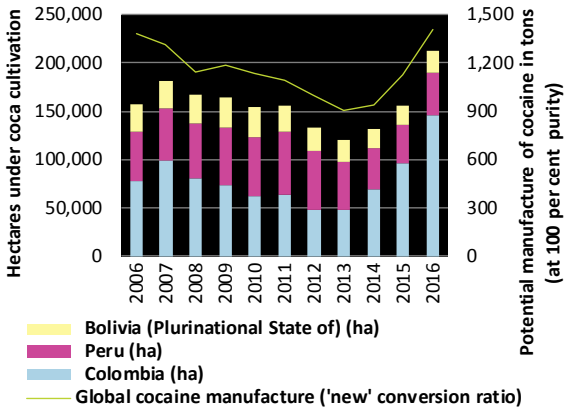
Total global opium production jumped by 65 per cent from 2016 to 2017, to 10,500 tons, easily the highest estimate recorded by UNODC since it started monitoring global opium production at the beginning of the twenty-first century.

A marked increase in opium poppy cultivation and a gradual increase in opium poppy yields in Afghanistan resulted in opium production in the country reaching 9,000 tons in 2017, an increase of 87 per cent from the previous year. Among the drivers of that increase were political instability, lack of government control and reduced economic opportunities for rural communities, which may have left the rural population vulnerable to the influence of groups involved in the drug trade.

The surge in opium poppy cultivation in Afghanistan meant that the total area under opium poppy cultivation worldwide increased by 37 per cent from 2016 to 2017, to almost 420,000 ha. More than 75 per cent of that area is in Afghanistan.

Overall seizures of opiates rose by almost 50 per cent from 2015 to 2016. The quantity of heroin seized globally reached a record high of 91 tons in 2016. Most opiates were seized near the manufacturing hubs in Afghanistan.

Global coca bush cultivation and cocaine manufacture, 2006–2016

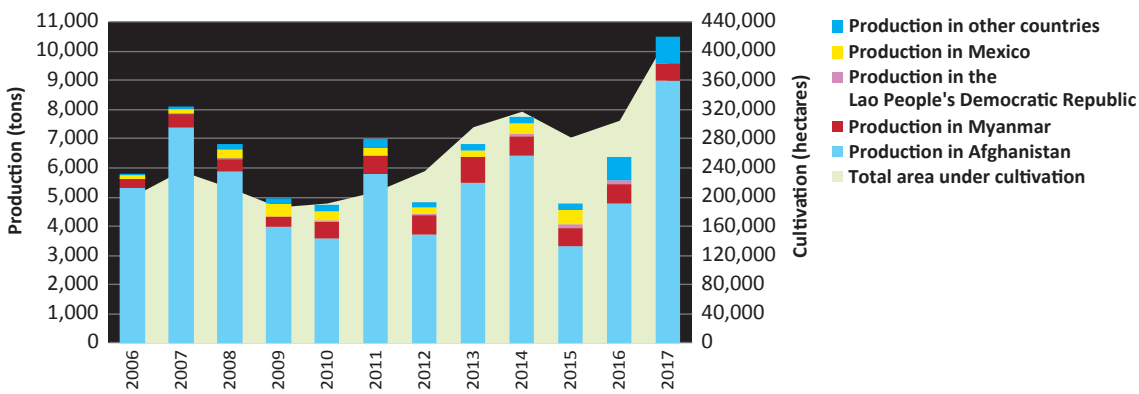


Sources: UNODC, coca cultivation surveys in Bolivia (Plurinational State of), Colombia and Peru, 2014 and previous years.

A notable increase has been seen in cocaine production

Global cocaine manufacture in 2016 reached its highest level ever: an estimated 1,410 tons. After falling during the period 2005–2013, global cocaine manufacture rose by 56 per cent during the period 2013–2016. The increase from 2015 to 2016 was 25 per cent.

Opium poppy cultivation and production of opium, 2006-2017[a]



Sources: UNODC, calculations are based on UNODC illicit crop monitoring surveys and the responses to the annual report questionnaire.

[a] *Data for 2017 are still preliminary.*

Most of the world's cocaine comes from Colombia, which boosted its manufacture by more than one third from 2015 to 2016, to some 866 tons. The total area under coca bush cultivation worldwide in 2016 was 213,000 ha, almost 69 per cent of which was in Colombia.

The dramatic resurgence of coca bush cultivation in Colombia — which had almost halved from 2000 to 2013 — came about for a number of reasons related to market dynamics, the strategies of trafficking organizations and expectations in some communities of receiving compensation for replacing coca bush cultivation, as well as a reduction in alternative development interventions and in eradication. In 2006, more than 213,000 ha were eradicated. Ten years later, the figure was less than 18,000 ha.

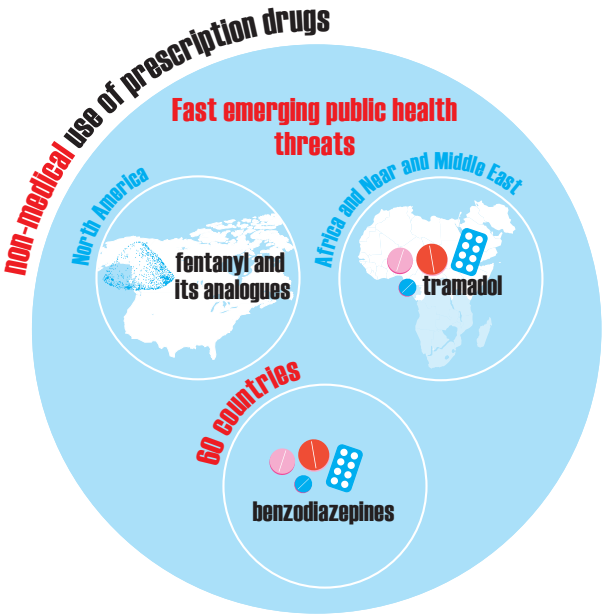
The result has been a perceived decrease in the risk of coca bush cultivation and a dramatic scaling-up of manufacture. Colombia has seen massive rises in both the number of cocaine laboratories dismantled and the amount of cocaine seized.

Non-medical use of prescription drugs is becoming a major threat around the world

The non-medical use of pharmaceutical opioids is of increasing concern for both law enforcement authorities and public health professionals. Different pharmaceutical opioids are misused in different regions. In North America, illicitly sourced fentanyl, mixed with heroin or other drugs, is driving the unprecedented number of overdose deaths. In Europe, the main opioid of concern remains heroin, but the non-medical use of methadone, buprenorphine and fentanyl has also been reported. In countries in West and North Africa and the Near and Middle East, the non-medical use of tramadol, a pharmaceutical opioid that is not under international control, is emerging as a substance of concern.

Non-medical use of and trafficking in tramadol are becoming the main drug threat in parts of Africa

The focus for global seizures of pharmaceutical opioids is now firmly on countries in West and Central Africa and North Africa, which accounted for 87 per cent of the global total in 2016. Countries in Asia, which had previously accounted for more than half of global seizures, reported just 7 per cent of the global total in 2016.



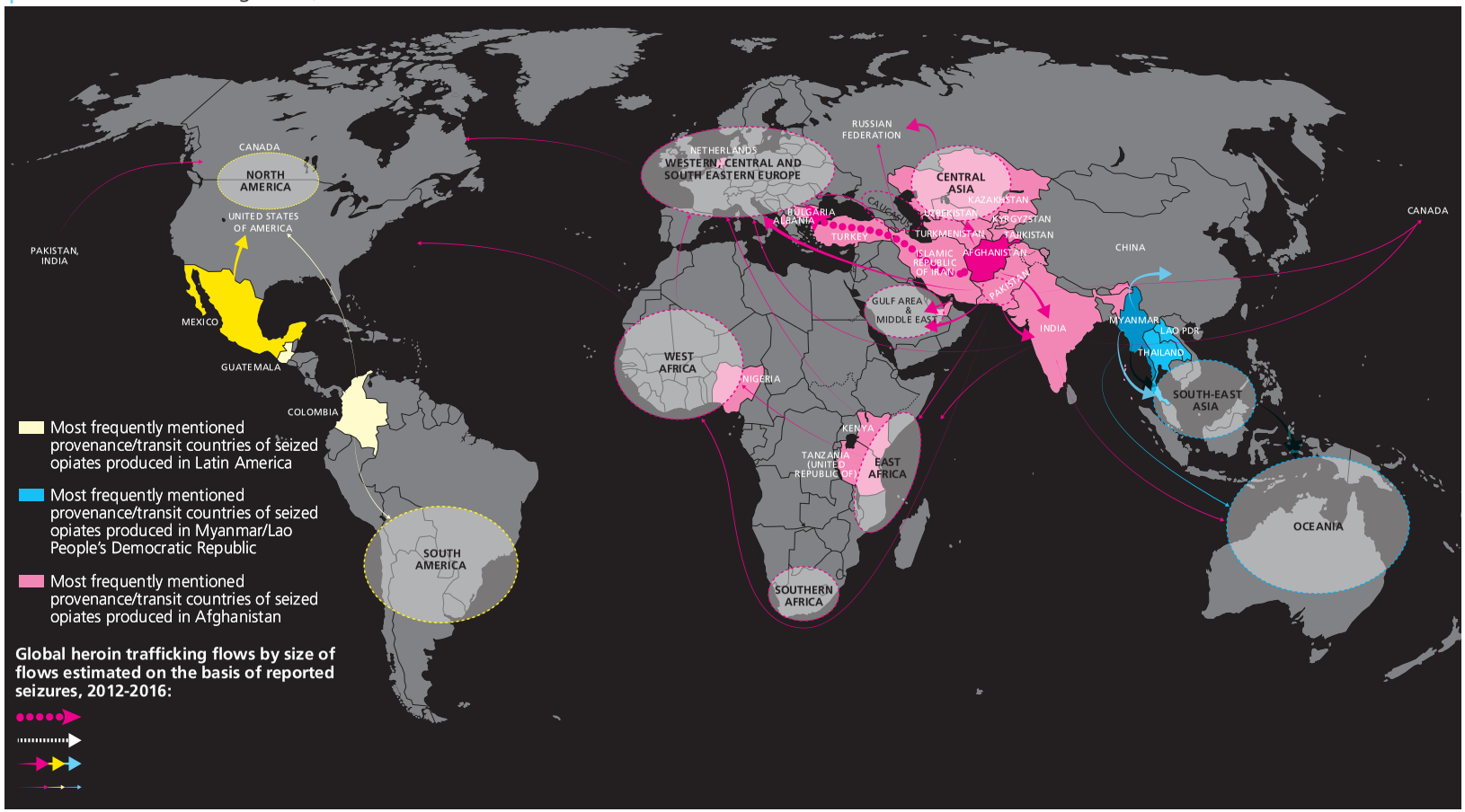
The rise in seizures of pharmaceutical opioids in Africa is mostly due to the worldwide popularity of tramadol, an opioid used to treat moderate and moderate-to-severe pain that is widely trafficked for non-medical use in the region. Tramadol is smuggled to various markets in West and Central Africa and North Africa, from where some of it is trafficked onwards to countries in the Near and Middle East. Countries in those subregions have reported the rapid expansion of the non-medical use of tramadol, in particular among some vulnerable populations. The drug is not yet under international control and is perceived by recreational users as a way of boosting energy and improving mood. However, tramadol can produce physical dependence, with WHO studies showing that this dependence may occur when it is used daily for more than a few weeks.

While some tramadol is diverted from licit channels, most of the tramadol seized worldwide in the period 2012–2016 appears to have originated in clandestine laboratories in Asia.

Non-medical use of pharmaceutical opioids reaches epidemic proportions in North America

In 2015 and 2016, for the first time in half a century, life expectancy in the United States of America

Main heroin trafficking flows, 2012–2016



Sources: UNODC, responses to the annual report questionnaire and individual drug seizure database.

Notes: The size of the trafficking flow lines is based on the amount of heroin seized in a subregion and the number of mentions of countries from where the heroin has departed (including reports of "origin" and "transit") to a specific subregion over the period 2012–2016. A darker shade indicates that the country represents more than 50 per cent of heroin production in the region. The trafficking flows are determined on the basis of country of origin/departure, transit and destination of seized drugs as reported by Member States in the annual report questionnaire and individual drug seizure database: as such, they need to be considered as broadly indicative of existing trafficking routes while several secondary flows may not be reflected. Flow arrows represent the direction of trafficking: origins of the arrows indicate either the area of manufacture or the one of last provenance, end points of arrows indicate either the area of consumption or the one of next destination of trafficking.

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declined for two consecutive years. A key factor was the increase in unintentional injuries, which includes overdose deaths.

In 2016, 63,632 people died from a drug overdose in the United States, the highest number on record and a 21 per cent increase from the previous year. This was largely due to a rise in deaths associated with pharmaceutical opioids, including fentanyl and fentanyl analogues. This group of opioids, excluding methadone, was implicated in 19,413 deaths in the country, more than double the number in 2015. Evidence suggests that Canada is also affected, with a large number of overdose deaths involving fentanyl and its analogues in 2016.

Illicit fentanyl and its analogues are reportedly mixed into heroin and other drugs, such as cocaine and MDMA, or "ecstasy", or sold as counterfeit prescription opioids. Users are often unaware of the contents of the substance they are taking, which inevitably leads to a great number of fatal overdoses.

Outside North America, the impact of fentanyl and its analogues is relatively low. In Europe, for example, opiates such as heroin and morphine continue to predominate, although some deaths involving fentanyl analogues have started to emerge in the region. A notable exception is Estonia, where fentanyl has long been regarded as the most frequently misused opioid. The downward trend in opiate use since the late 1990s observed in Western and Central Europe appears to have come to an end in 2013. In that subregion as a whole, 12 countries reported stable trends in heroin use in 2016, two reported a decline and three an increase.

Misuse of sedatives and stimulants brings growing risks

Many countries are now reporting the non-medical use of benzodiazepines as one of the main drug use problems

Non-medical use of the common sedative/hypnotic benzodiazepines and similar substances is now one of the main drug use problems in some 60 countries.

The misuse of benzodiazepines carries serious risks, not least an increased risk of overdose when used in combination with heroin. Benzodiazepines are frequently reported in fatal overdose cases involving opioids such as methadone.

A market for non-controlled benzodiazepine-type substances, used alone or in combination with controlled benzodiazepines, is emerging in some Western countries. These substances are marketed legally as tranquillizers and are sold under names such as "legal benzodiazepines" or "designer benzodiazepines". In specific cases, a large proportion of drug-related deaths is related to benzodiazepine-type NPS.

Kratom, a plant-based substance used as traditional medicine in some parts of Asia, is emerging as a popular plant-based new psychoactive substance

Kratom products are derived from the leaf of the kratom tree, which is used in South-East Asia as a traditional remedy for minor ailments and for non-medical purposes. Few countries have placed kratom under national legal control, making it relatively easy to buy.

There are now numerous products around the world advertised as containing kratom, which usually come mixed with other substances. People who use opioids in the United States have reported using kratom products for the self-management of withdrawal symptoms. Some 500 tons of kratom were intercepted during 2016, triple the amount of the previous year, suggesting a boom in its popularity.

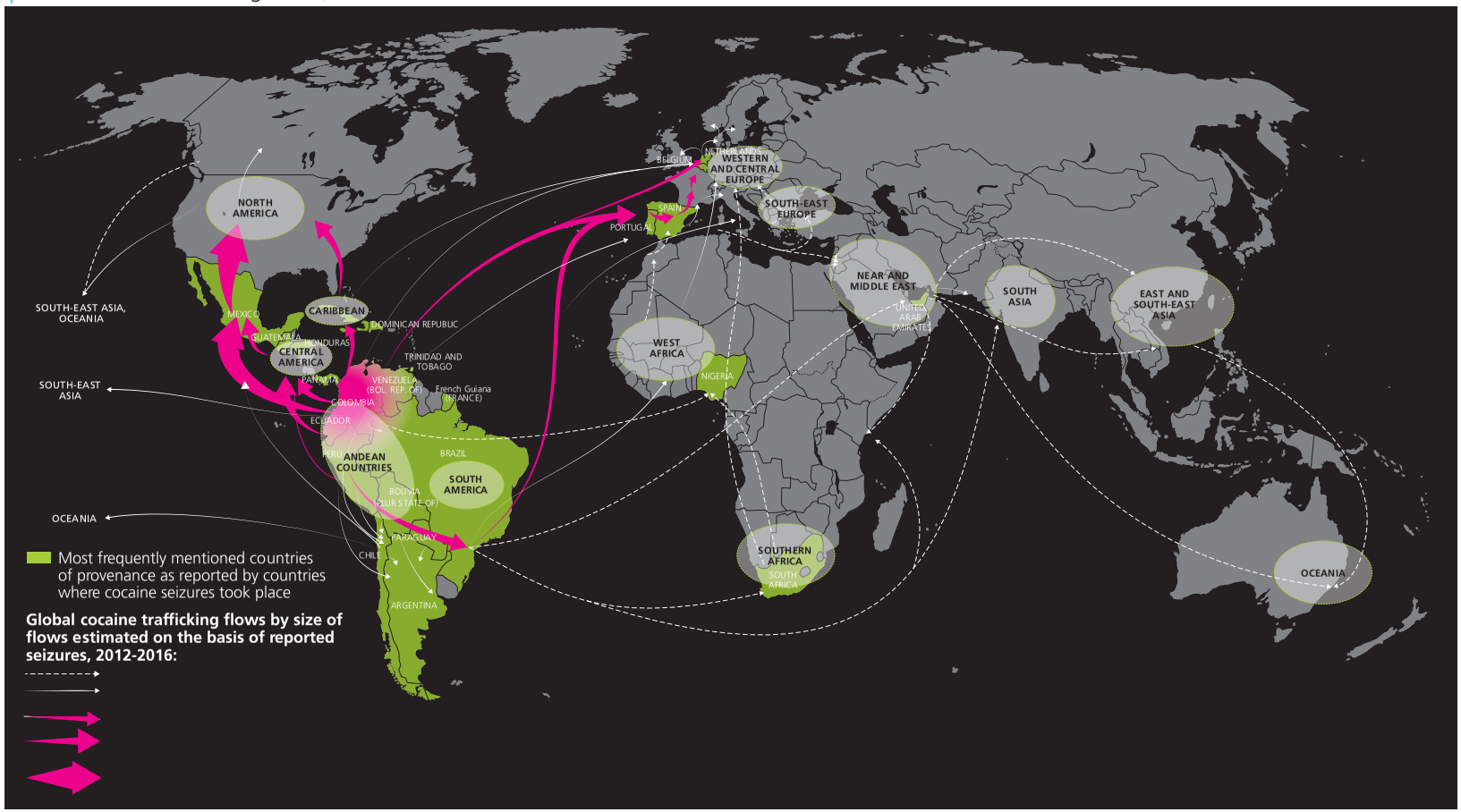
MARKET DEVELOPMENTS

Cannabis remains the world's most commonly used drug

Cannabis was the most commonly used drug in 2016, with 192 million people using it at least once in the past year. The global number of cannabis users continues to rise and appears to have increased by roughly 16 per cent in the decade ending 2016, which is in line with the increase in the world population.

The quantities of cannabis herb seized globally declined by 27 per cent, to 4,386 tons, in 2016. The decline was particularly marked in North America, where the availability of medical cannabis in many jusrisdictions and the legalization of cannabis for recreational use in several states of the United States may have played a role.

Main cocaine trafficking flows, 2012–2016



Sources: UNODC, responses to the annual report questionnaire and individual drug seizure database.

Notes: The size of the trafficking flow lines is based on the amount of cocaine seized in a subregion and the number of mentions of countries from where the cocaine has departed (including reports of "origin" and "transit") to a specific subregion over the period 2012–2016. The trafficking flows are determined on the basis of country of origin/departure, transit and destination of seized drugs as reported by Member States in the annual report questionnaire and individual drug seizure database: as such, they need to be considered as broadly indicative of existing trafficking routes while several secondary flows may not be reflected. Flow arrows represent the direction of trafficking: origins of the arrows indicate either the area of manufacture or the one of last provenance, end points of arrows indicate either the area of consumption or the one of next destination of trafficking.

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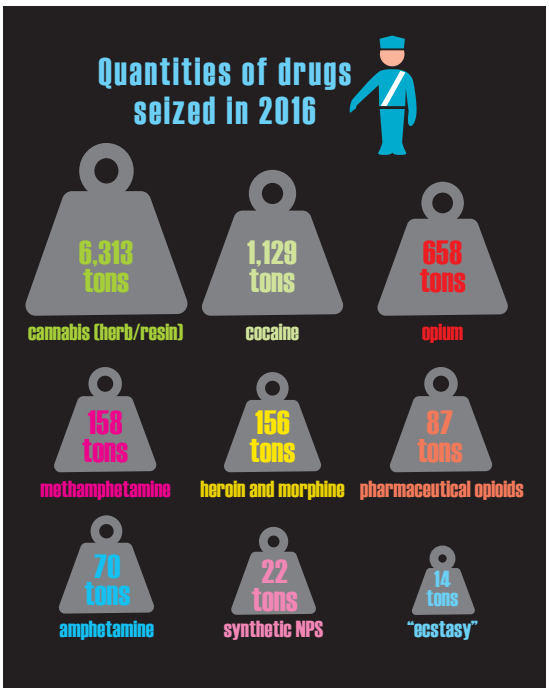


Too early to determine the impact of latest developments in recreational cannabis regulations

Since 2017, the non-medical use of cannabis has been allowed in eight state-level jurisdictions in the United States, in addition to the District of Columbia. Colorado was one of the first states to adopt measures to allow the non-medical use of cannabis in the United States. Cannabis use has increased significantly among the population aged 18–25 years and older in Colorado since legalization, while it has remained relatively stable among those aged 17–18 years. However, there has been a significant increase in cannabis-related emergency room visits, hospital admissions and traffic deaths, as well as instances of people driving under the influence of cannabis in the State of Colorado.

In Uruguay, up to 480 grams per person per year of cannabis can now be obtained through pharmacies, cannabis clubs or individual cultivation. Cannabis regulation in the country allows for the availability of cannabis products with a tetrahydrocannabinol content of up to 9 per cent and a minimum cannabidiol content of 3 per cent. In mid-2017, the registration of those who choose to obtain cannabis for non-medical use through pharmacies began, as did the sale of the drug through a network of 16 pharmacies.

Effect of the crackdown on darknet drug dealers is not yet clear

In July 2017, police forces from several countries worked together to take down the largest drug-trading platform on the darknet, the part of the "deep web" containing information that is only accessible using special web browsers. Before it was closed, AlphaBay had featured more than 250,000 listings for illegal drugs and chemicals. It had had over 200,000 users and 40,000 vendors during its existence. The authorities also succeeded in taking down the trading platform Hansa, described as the third largest criminal marketplace on the dark web.

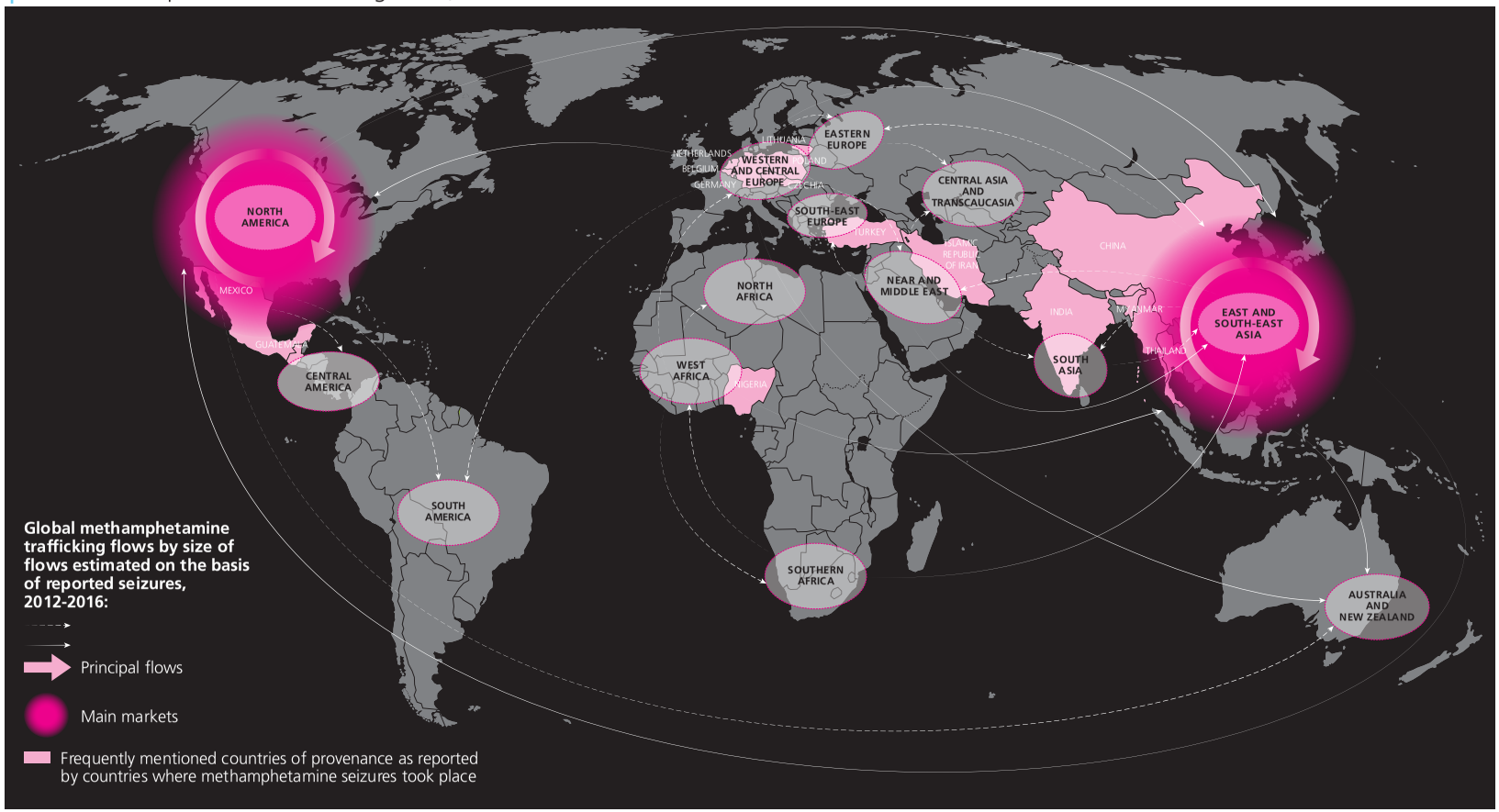
It is not yet clear what effect the closures will have. According to an online survey in January 2018, 15 per cent of those who had used darknet sites for purchasing drugs said that they had used such markets less frequently since the closures, and 9 per cent said they had completely stopped. However, more than half did not consider themselves to have been affected by the closures.

Although the scale of drug trafficking on the darknet remains limited, it has shown signs of rapid growth. Authorities in Europe estimated that drug sales on the darknet from 22 November 2011 to 16 February 2015 amounted to roughly $44 million per year. However, a later study estimated that, in early 2016, drug sales on the darknet were between $14 million and $25 million per month, equivalent to between $170 million and $300 million per year.

Africa and Asia have emerged as cocaine trafficking and consumption hubs

Most indicators from North America suggest that cocaine use rose between 2013 and 2016. In 2013, there were fewer than 5,000 cocaine-related deaths in the United States, but by 2016 the figure was more than 10,000. Although many of those deaths also involved synthetic opioids and cannot be attributed exclusively to higher levels of cocaine consumption, the increase is nonetheless a strong indicator of increasing levels of harmful cocaine use.

Main methamphetamine trafficking flows, 2012–2016



Sources: UNODC, responses to the annual report questionnaire and individual drug seizure database.

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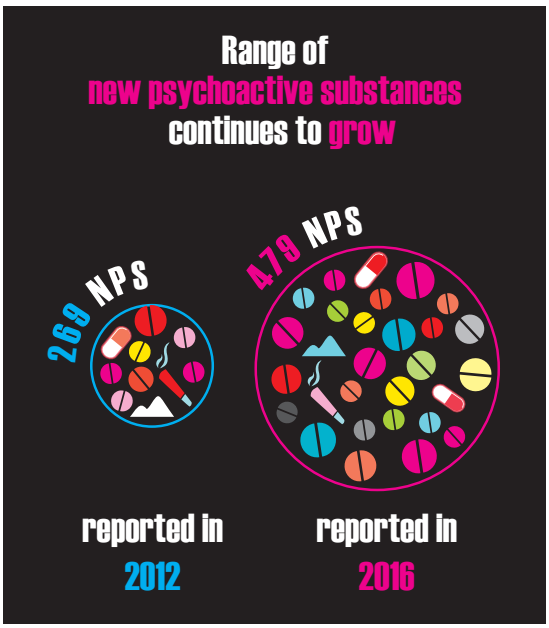


The biggest growth in cocaine seizures in 2016 took place in Asia and Africa, reflecting the ongoing spread of cocaine trafficking and consumption to emerging markets. Although starting from a much lower level than North America, the quantity of cocaine seized in Asia tripled from 2015 to 2016; in South Asia, it increased tenfold. The quantity of cocaine seized in Africa doubled in 2016, with countries in North Africa seeing a sixfold increase and accounting for 69 per cent of all the cocaine seized in the region in 2016. This was in contrast to previous years, when cocaine tended to be seized mainly in West and Central Africa.

Trafficking in and use of synthetic drugs expands beyond established markets, and major markets for methamphetamine continue to grow

East and South-East Asia and North America remain the two main subregions for methamphetamine trafficking worldwide. In North America, the availability of methamphetamine was reported to have increased between 2013 and 2016, and, in 2016, the drug was reported to be the second greatest drug threat in the United States, after heroin.

Based on qualitative assessments, increases in consumption and manufacturing capacity and increases in the amounts seized point to a growing market for methamphetamine in East and South-East Asia and Oceania, where the use of crystalline methamphetamine in particular has become a key concern.

For many years, amphetamine dominated synthetic drug markets in the Near and Middle East and Western and Central Europe, but recent increases in the quantities seized in North Africa and North America point to growing activity in other subregions. While the reasons for the spike in the quantity of amphetamine seized in North Africa are not entirely clear, it may be related to the trafficking of amphetamine destined for the large market in the neighbouring subregion of the Near and Middle East.

Growth in the complexity and diversity of the synthetic drug market is leading to an increase in related harm

In recent years, hundreds of NPS have been synthesized and added to the established synthetic drug market for amphetamine-type substances. Grouped according to their main pharmacological effect, the largest portion of NPS reported since UNODC began monitoring are stimulants, followed

by cannabinoid receptor agonists and classic hallucinogens.

A total of 803 NPS were reported in the period 2009–2017. However, while the global NPS market remains widely diversified, with the exception of a few substances, NPS do not seem to have established themselves on drug markets or replaced traditional drugs on a larger scale.

Although the overall quantity of NPS seized fell in 2016, an increasing number of countries have been reporting NPS seizures, and concerns have been growing over the harm caused by the use of NPS. In several countries, an increasing number of NPS with opioid effects emerging on the market have been associated with fatalities. The injecting use of stimulant NPS also remains a concern, in particular because of reported associated high-risk injecting practices. NPS use in prisons and among people on probation remains an issue of concern in some countries in Europe, North America and Oceania.

VULNERABILITIES OF PARTICULAR GROUPS

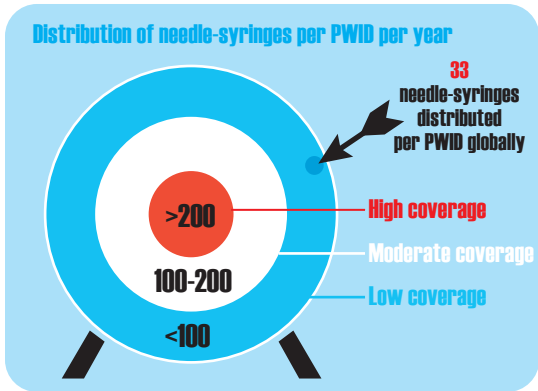
Many countries still fail to provide adequate drug treatment and health services to reduce the harm caused by drugs

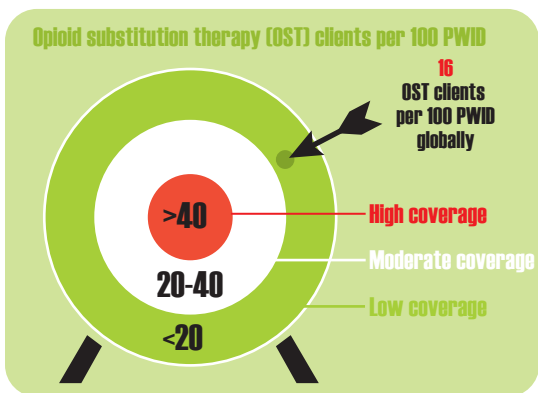
One in six people suffering from drug use disorders received treatment for those disorders during 2016, which is a relatively low proportion that has remained constant in recent years.

Some of the most adverse health consequences of drug use are experienced by PWID. A global review of services aimed at reducing adverse health consequences among PWID has suggested that only 79 countries have implemented both needle and syringe programmes and opioid substitution therapy. Only four countries were classified as having high levels of coverage of both of those types of interventions.

Information on the availability of HIV testing and counselling and antiretroviral therapy remains sparse: only 34 countries could confirm the availability of HIV-testing programmes for PWID, and 17 countries confirmed that they had no such programmes. There was no information on the availability of antiretroviral therapy for 162 countries.

Global targets for the distribution of needle-syringes and opium substitution therapy missed





Drug use and the associated harm are highest among young people

Surveys on drug use among the general population show that the extent of drug use among young people remains higher than that among older people, although there are some exceptions associated with the traditional use of drugs such as opium or khat. Most research suggests that early (12–14 years old) to late (15–17 years old) adolescence is a critical risk period for the initiation of substance use and that substance use may peak among young people aged 18–25 years.

Cannabis is a common drug of choice for young people

There is evidence from Western countries that the perceived easy availability of cannabis, coupled with

perceptions of a low risk of harm, makes the drug among the most common substances whose use is initiated in adolescence. Cannabis is often used in conjunction with other substances and the use of other drugs is typically preceded by cannabis use.

Two extreme typologies of drug use among young people: club drugs in nightlife settings; and inhalants among street children

Drug use among young people differs from country to country and depends on the social and economic circumstances of those involved.

Two contrasting settings illustrate the wide range of circumstances that drive drug use among young people. On the one hand, drugs are used in recreational settings to add excitement and enhance the experience; on the other hand, young people living in extreme conditions use drugs to cope with their difficult circumstances.

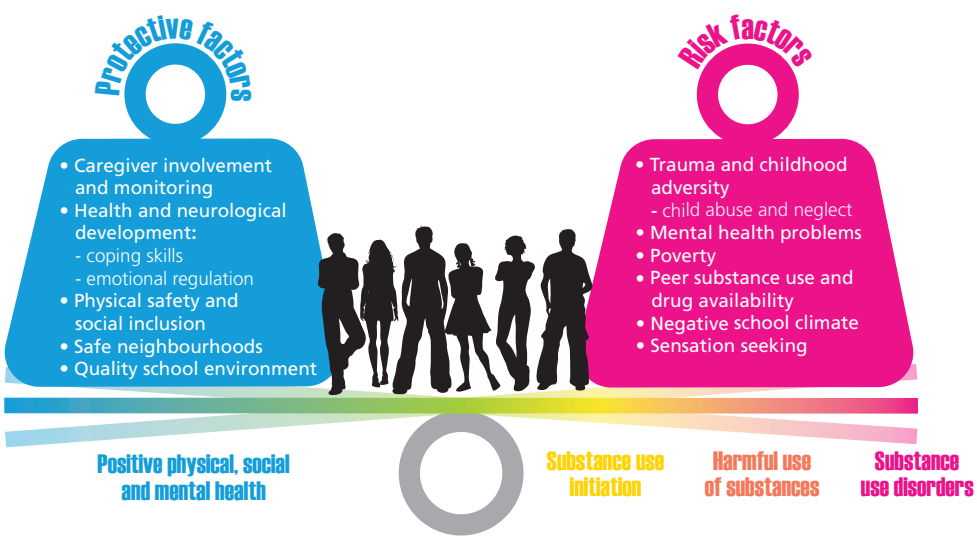
The typologies of drugs used in these two different settings are quite different. Club drugs such as "ecstasy", methamphetamine, cocaine, ketamine, LSD and GHB are used in high-income countries, originally in isolated "rave" scenes but later in settings ranging from college bars and house parties to concerts. The use of such substances is reportedly much higher among young people. Among young people living on the street, the most commonly used drugs are likely to be inhalants, which can include paint thinner, petrol, paint, correction fluid and glue.

Many street children are exposed to physical and sexual abuse, and substance use is part of their coping mechanism in the harsh environment they are exposed to on the streets. The substances they use are frequently selected for their low price, legal and widespread availability and ability to rapidly induce a sense of euphoria.

Young people's path to harmful substance use is complex

The path from initiation to harmful use of substances among young people is influenced by factors that are often out of their control. Factors at the personal level (including behavioural and mental health, neurological developments and gene variations resulting from social influences), the micro level (parental and family functioning, schools and peer influences) and the macro level (socioeconomic and physical environment) can render adolescents vulnerable to substance use. These factors vary between individuals and not all young people are equally vulnerable to substance use. No factor alone is sufficient to lead to the use of substances and, in many instances, these influences change over time. Overall, it is the critical combination of the risk

Protective factors and risk factors for substance use



factors that are present and the protective factors that are absent at a particular stage in a young person's life that makes the difference in their susceptibility to drug use. Early mental and behavioural health problems, poverty, lack of opportunities, isolation, lack of parental involvement and social support, negative peer influences and poorly equipped schools are more common among those who develop problems with substance use than among those who do not.

Harmful substance use has multiple direct effects on adolescents. The likelihood of unemployment, physical health problems, dysfunctional social relationships, suicidal tendencies, mental illness and even lower life expectancy is increased by substance use in adolescence. In the most serious cases, harmful drug use can lead to a cycle in which damaged socioeconomic standing and ability to develop relationships feed substance use.

Poverty and a lack of opportunities for social and economic advancement can lead young people to become involved in the drug supply chain

Young people are also known to be involved in the cultivation, manufacturing and production of and trafficking in drugs. In the absence of social and economic opportunities, young people may deal drugs to earn money or to supplement meagre wages. Young people affected by poverty or in other vulnerable groups, such as immigrants, may be recruited by organized crime groups and coerced into working in drug cultivation, production, trafficking and local-level dealing. In some environments, young people become involved in drug supply networks because they are looking for excitement and a means to identify with local groups or gangs. Organized crime groups and gangs may prefer to recruit children and young adults for drug trafficking for two reasons: the first is the recklessness associated with younger age groups, even when faced with the police or rival gangs; the second is their obedience. Young people involved in the illicit drug trade in international markets are often part of large organized crime groups and are used mainly as "mules", to smuggle illegal substances across borders.

Drug use among older people requires attention

Increases in rates of drug use among older people are partly explained by ageing cohorts of drug users

Drug use among the older generation (aged 40 years and older) has been increasing at a faster rate than among those who are younger, according to the limited data available, which are mainly from Western countries.

People who went through adolescence at a time when drugs were popular and widely available are more likely to have tried drugs and, possibly, to have continued using them, according to a study in the United States. This pattern fits in particular the so-called "baby boomer" generation in Western Europe and North America. Born between 1946 and 1964, baby boomers had higher rates of substance use during their youth than previous cohorts; a significant proportion continued to use drugs and, now that they are over 50, this use is reflected in the data.

In Europe, another cohort effect can be gleaned from data on those seeking treatment for opioid use. Although the number of opioid users entering treatment is declining, the proportion who were aged over 40 increased from one in five in 2006 to one in three in 2013. Overdose deaths reflect a similar trend: they increased between 2006 and 2013 for those aged 40 and older but declined for those aged under 40. The evidence points to a large cohort of ageing opioid users who started injecting heroin during the heroin "epidemics" of the 1980s and 1990s.

Older people who use drugs require tailored services, but few treatment programmes address their specific needs

Older drug users may often have multiple physical and mental health problems, making effective drug treatment more challenging, yet little attention has been paid to drug use disorders among older people. There were no explicit references to older drug users in the drug strategies of countries in Europe in 2010 and specialized treatment and care programmes for older drug users are rare in the region; most initiatives are directed towards younger people.

Older drug users account for an increasing share of deaths directly caused by drug use

Globally, deaths directly caused by drug use increased by 60 per cent from 2000 to 2015. People over the age of 50 accounted for 39 per cent of the deaths related to drug use disorders in 2015. However, the proportion of older people reflected in the statistics has been rising: in 2000, older people accounted for just 27 per cent of deaths from drug use disorders.

About 75 per cent of deaths from drug use disorders among those aged 50 and older are linked to the use of opioids. The use of cocaine and the use of amphetamines each account for about 6 per cent; the use of other drugs makes up the remaining 13 per cent.

Women's drug use differs greatly from men's

Non-medical use of tranquillizers and opioids is common

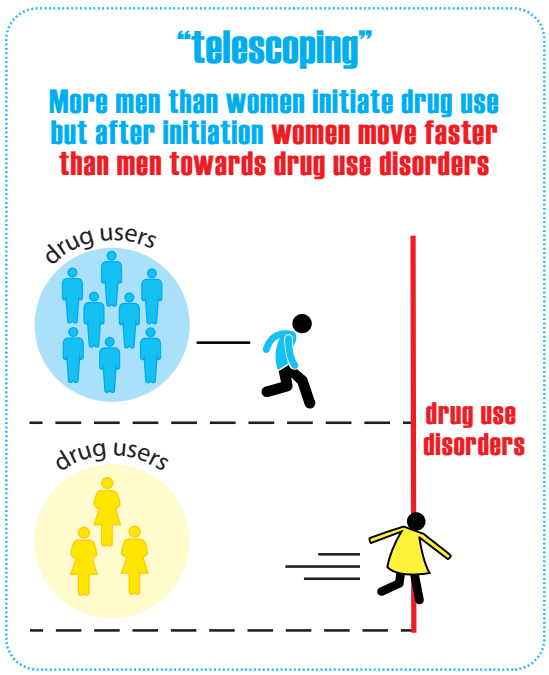
The prevalence of the non-medical use of opioids and tranquillizers by women remains at a comparable level to that of men, if not actually higher. On the other hand, men are far more likely than women to use cannabis, cocaine and opiates. Women continue to account for only one in five people in treatment. The proportion of females in treatment tends to be higher for tranquillizers and sedatives than for other substances.

While women who use drugs typically begin using substances later than men, once they have initiated substance use, women tend to increase their rate of consumption of alcohol, cannabis, cocaine and opioids more rapidly than men. This has been consistently reported among women who use those substances and is known as "telescoping". Another difference is that women are more likely to associate their drug use with an intimate partner, while men are more likely to use drugs with male friends.

Women who have experienced childhood adversity internalize behaviours and may use drugs to self-medicate

Internalizing problems such as depression and anxiety are much more common among women than among men. Men are more likely than women to suffer from externalizing behaviour problems such as conduct disorder, attention-deficit hyperactivity disorder and anti-social personality disorder. Women with substance use disorders are reported to have high rates of post-traumatic stress disorder and may also have experienced childhood adversity such as physical neglect, abuse or sexual abuse. Women who use drugs may also have responsibilities as caregivers, and their drug use adversely affects their families, in particular children. Such adverse childhood experiences can be transgenerational and impart the risks of substance use to the children of women with drug use disorders.

Post-traumatic stress disorder among women is most commonly considered to have derived from a history of repetitive childhood physical and sexual abuse. Childhood adversity seems to have a different impact on males and females. Research has shown that boys who have experienced childhood adversity use drugs as a means of social defiance. On the other hand, girls who have experienced adversity are more likely to internalize it as anxiety, depression and social withdrawal and are more likely to use substances for self-medication.



Women are at a higher risk for infectious diseases than men

Women make up one third of drug users globally and account for one fifth of the global estimated number of PWID. Women have a greater vulnerability than men to HIV, hepatitis C and other blood-borne infections. Many studies have reported female gender as an independent predictor of HIV and/or hepatitis C among PWID, particularly among young women and those who have recently initiated drug injection.

The relationship between women and the drug trade is not well understood

Women may not only be victims but also active participants in the drug trade

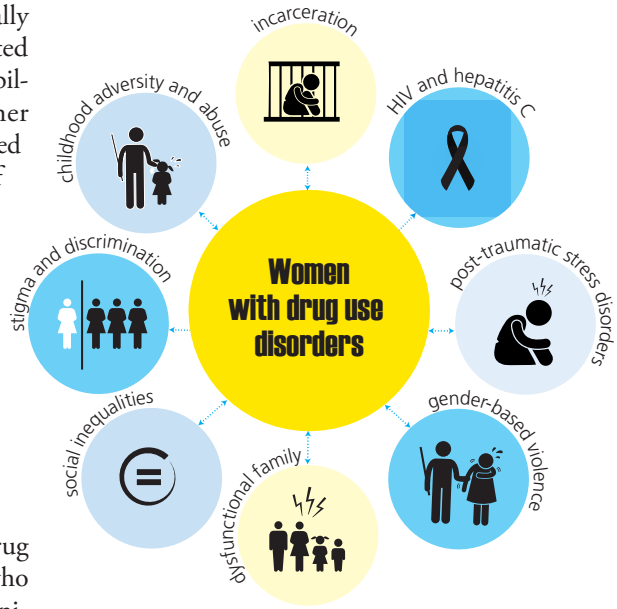
Women play important roles throughout the drug supply chain. Criminal convictions of women who presided over international drug trafficking organizations — particularly in Latin America, but also in Africa — attest to this. Women's involvement in opium poppy cultivation in Afghanistan and coca cultivation in Colombia is well documented, as is the role that women play in trafficking drugs, as drug mules.

However, there is a lack of consistent data from Governments to enable a deeper understanding of those roles: 98 countries provided sex-disaggregated drug-related crime data to UNODC for the period 2012–2016. Of the people arrested for drug-related offences in those countries during that period, some 10 per cent were women.

As suggested in several studies, women may become involved in drug trafficking to sustain their own drug consumption; however, as shown in other studies, some women involved in trafficking in drugs are victims of trafficking in persons, including trafficking for the purposes of sexual exploitation.

Women's participation in the drug supply chain can often be attributed to vulnerability and oppression, where they are forced to act out of fear. Moreover, women may accept lower pay than men: some researchers have noted that women may feel compelled to accept lower rates of payment than men to carry out drug trafficking activities, which means

Causes and consequences of drug use disorders among women



that some drug trafficking organizations may be more likely to use women as "mules".

Another narrative has emerged critiquing this approach and arguing that women might be empowered key actors in the drug world economy. Cases have also been documented in which women are key actors in drug trafficking, by choice. Neither explanation provides a complete picture of women's involvement in the drug supply chain — some are victims, others make their own decisions. Involvement in the illicit drug trade can offer women the chance to earn money and achieve social mobility, but it can also exacerbate gender inequalities because they may still be expected to perform the traditional gender roles of mothers, housekeepers and wives.

Overall, although a multiplicity of factors are behind the participation of women in the drug trade, it has been shown to be shaped by socioeconomic vulnerability, violence, intimate relationships and economic considerations.

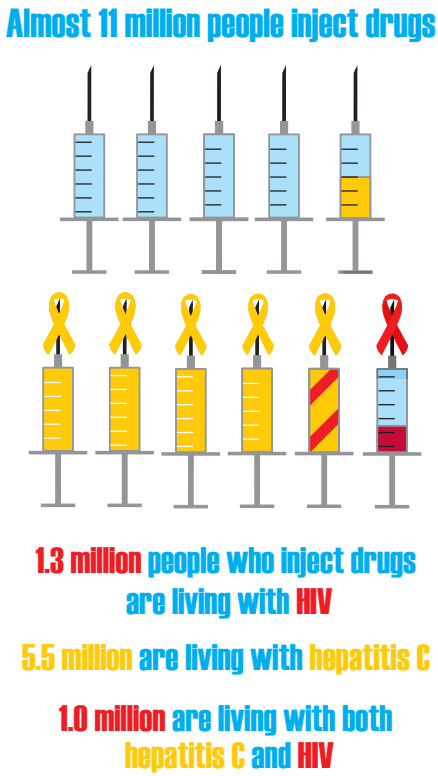
Prisoners, in particular women, are at higher risk for infectious diseases but are poorly served

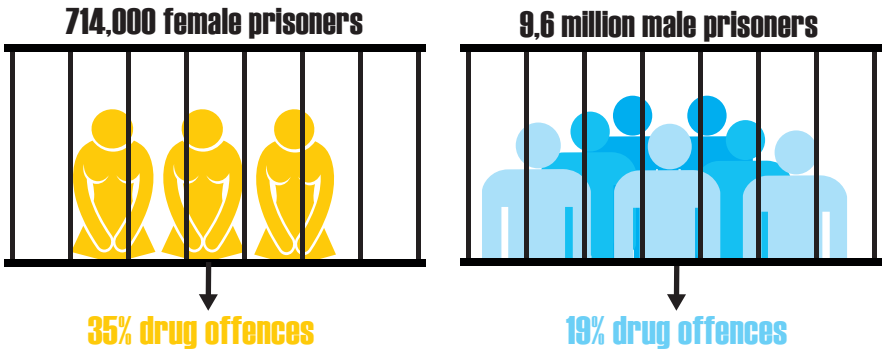
People in prisons and other closed settings are at a much greater risk of contracting infections such as

tuberculosis, HIV and hepatitis C than the general population, but access to treatment and prevention programmes is often lacking. Even where such programmes are available, they are not necessarily of the same standard as those provided in the community. The lack of access to prevention measures in many prisons can result in the rapid spread of HIV and other infections.

People who use heroin are exposed to a severe risk of death from overdose after release from prison, especially in the first two weeks. Such deaths are related to a lowered tolerance to the effects of heroin use developed after periods of relative abstinence, including during incarceration. However, released prisoners are rarely able to access overdose management interventions, including prevention medications such as naloxone, or treatment for substance dependence, including methadone.

Women who are incarcerated have even less access than their male counterparts to health-care services to address their drug use, other health conditions and sexual and reproductive health needs. In addition, fewer women than men generally receive enough preparation and support for their return to their family or to the community in general. Upon release, women face the combined stigma of their gender and their status as ex-offenders and face challenges, including discrimination, in accessing health-care and social services.





Source: Based on Roy Walmsley, "World prison population list", 11th ed. (Institute for Criminal Policy Research, 2016) and Roy Walmsley, "World female imprisonment list", 4th ed. (Institute for Criminal Policy Research, 2017).
Share of prisoners for drug offences based on 50 Member States (UNODC, Special data collections on persons held in prisons (2010-2014), United Nations Surveys on Crime Trends and the Operations of Criminal Justice Systems (UN-CTS).

CONCLUSIONS AND POLICY IMPLICATIONS

The information presented in the *World Drug Report 2018* illustrates the unprecedented magnitude and complexity of the global drug markets. The adverse health consequences caused by drug use remain significant, drug-related deaths are on the rise and there are ongoing, concentrated opioid epidemics.

This situation calls for renewed efforts to support the prevention and treatment of drug use and the delivery of services aimed at reducing the adverse health consequences of drug use, in line with targets 3.5 and 3.3 of the Sustainable Development Goals. Young people need to be made aware not only of the medical but also of the socioeconomic harm associated with drug use. Efforts to support the prevention and treatment of drug use also include providing people who use drugs with the necessary knowledge and skills to prevent overdoses, including through the administration of naloxone; providing continuity of health-care services for those in prison and upon their release; and scaling up core interventions, as outlined in the *WHO, UNODC, UNAIDS Technical Guide for Countries to Set Targets for Universal Access to HIV Prevention, Treatment and Care for Injecting Drug Users*, to help prevent the spread of HIV and hepatitis C among PWID.

These efforts can only be effective if they are based on scientific evidence and respect for human rights and if the stigma associated with drug use is removed. Such stigma can be overcome by increasing understanding of drug use disorders as complex, multifaceted and relapsing chronic conditions that require continuing care and interventions from many disciplines.

There are emerging trends that have the potential to trigger a supply-driven expansion of the illicit markets for heroin, prescription opioids and cocaine. These new dynamics are of concern as they can have a particularly detrimental effect on countries with limited resources, where they can take a heavy toll on health and may weaken the security situation.

Tramadol, the double tragedy of developing countries, requires greater attention

The rapid expansion in Africa and Asia of the use of illicitly supplied tramadol, a synthetic opioid used to treat moderate and moderate-to-severe pain, is posing serious public health challenges. While many patients continue to have insufficient access to necessary pain medication and would benefit from greater accessibility to opioids for medical use, the increasing flow of synthetic opioids destined for non-medical consumption could lead to an increase in the number of people developing opioid use disorders. This puts additional pressure on the already fragile health systems of the affected countries, which already struggle to meet basic health-care needs, in particular those of the poor and disadvantaged, and have limited availability and coverage of services for substance use disorders.

Although the opioid overdose crisis in North America has received international attention, the growing problem associated with the non-medical use of synthetic opioids such as tramadol in developing countries has remained under-researched and has so far gone largely unnoticed.

New efforts are needed to better understand the challenges associated with the illicit supply of synthetic opioids and the problems that their non-medical use cause to public health in developing countries. In the spirit of shared responsibility, the international community has a role in addressing the challenges faced by affected countries in Asia and Africa. It needs to invest in improving understanding of the nature and cause of the problem and to help the countries concerned to develop drug prevention, treatment, care and rehabilitation services to minimize the public health problems related to the non-medical use of prescription opioids such as tramadol. The flow of synthetic opioids packaged and destined for non-medical purposes also needs to be stopped.

Health and security threats posed by record high production of opiates and the manufacture of cocaine call for enhanced coordinated responses by countries along the supply chain

The massive increase in opiate production in Afghanistan and cocaine manufacture in Colombia threatens the security system in those two countries. In Afghanistan, the increased profits generated by the record production of opiates are likely to further fuel instability and insurgency and increase funding to terrorist groups both inside and outside the country. The expanding illicit economy, which has made many communities dependent on the income from opium poppy cultivation, is also likely to further constrain the development of the licit economy and to fuel corruption in Afghanistan. Most of the profit generated by trafficking in Afghan opiates are made in the major consumer markets, mainly in Europe and Asia. Those profits also fund organized crime, corruption and the illicit economy in destination countries. The expanding cocaine market in Colombia poses a challenge to the implementation of the peace accord and it is bound to augment the power and wealth of trafficking groups in the Americas, Africa and Europe. The increase in opium poppy and coca bush cultivation cannot be reversed unless communities in cultivating areas are provided with the means to develop an alternative livelihood. In Colombia, for example, alternative development initiatives have undergone a period of transition from an approach based on crop elimination to an approach based on promoting the rule of law.

The expansion of the global cocaine and opiate markets suggests that there will be a substantial increase in the profits derived from drug trafficking and related illicit financial flows, which may also contribute to the financing of other threats such as terrorism. The cocaine- and opiate-related economy is already having a major impact not only on the licit economy but also on democratic processes. By threatening the implementation of the rule of law and governance in general, the illicit drug economy is having a detrimental impact on the development of effective, accountable and inclusive institutions at all levels, undermining efforts to achieve Sustainable Development Goal 16. While this phenomenon was for a long time limited to the main cocaine and opiate production areas, it is now spreading to transit countries in Latin America, West Asia and Africa and has the potential to expand into other regions such as Central and East Asia, suggesting the possible extension of that detrimental impact to destination markets. These dynamics call for more research to help understand the links between drugs and terrorism, organized crime and corruption, as well as coordinated action to invest in long-term alternative development, integration efforts and international cooperation.

While the toll on health from cocaine and opiate consumption has long been borne mainly by countries that are the destination markets, it is increasingly becoming a challenge for other regions where cocaine markets are emerging and opiate markets seem to be expanding. The increases in opiate production and cocaine manufacture will have major implications for drug use globally. Increasing numbers of shipments of opiates from Afghanistan to destination markets in neighbouring countries and in Europe, and along the main trafficking routes worldwide, may have spillover effects in the next few years. More high-quality, low-cost heroin is likely to reach consumer markets across the world, with increased consumption and related harms the likely consequences. Increased awareness among users and potential users of the implications of their behaviour on communities in producing countries is needed.

The implications of the record cocaine production in Colombia are already visible in the two main established markets for the drug, North America and Western and Central Europe, where there are signs of an increase in use. It is likely, however, that some cocaine will also find its way to new markets, supplying the growing middle class in the large economies in Asia, where the drug has started to appear, and with possible spillover along the way, in particular in Africa.

Timely assessments are needed for countries that could be affected by increased trafficking to allow them to understand the magnitude of trafficking flows and equip themselves appropriately so that they can provide services to prevent the expansion of drug use and provide treatment and services in order to minimize the adverse health consequences

that drug use can cause. Comprehensive approaches need to be implemented that are truly global and encompass all facets of the current threat.

Health and security threats posed by the expansion of methamphetamine trafficking also call for enhanced coordinated responses by countries along the drug supply chain

In terms of synthetic drugs, the expansion of methamphetamine trafficking in East and South-East Asia poses a serious health and security challenge to the population in the subregion. The increasing flow of methamphetamine is likely to increase the number of people suffering from the negative health consequences of methamphetamine use and developing a substance use disorder, but not all countries in the subregion are equipped to serve an increasing demand for treatment. More investment in prevention and treatment and closer collaboration in drug control will be needed at the regional and international level to develop effective responses to these challenges.

Increasing drug use among older people requires new responses

There has been an increase in global deaths directly related to the use of drugs among older people, and an increase in drug use among older people in the few countries where information is available. This calls for targeted efforts to prevent, treat and minimize the impact of drug use among this population group. There are particular and wide-ranging health issues that arise from drug use among older users, in particular for those with a history of drug use disorders and dependence. Treatment for substance use is more complicated because there are multiple physical and mental health issues among older people who use drugs.

Infrastructure is not yet in place to deal with the growing number of older drug users and their health needs over the coming decades. There is often no explicit reference to older users in drug strategies in countries with ageing populations, which is where this issue requires most attention. Specialized treatment and care programmes for older drug users are rare; most initiatives are directed towards younger people.

Treatment and care will need to incorporate specialized drug treatment programmes with mainstream health-care and social support services. Novel, integrated and multidisciplinary approaches to care are required to address the health and social needs of older drug users.

Effectively addressing and countering the world drug problem to achieve progress on sustainable development goals related to young people and women

The 2030 Agenda for Sustainable Development and its goals affirm that "there can be no sustainable development without peace and no peace without sustainable development". This draws together the strands of peace, rule of law, human rights, development and equality to form a comprehensive and forward-looking framework. Countering the world drug problem and efforts to achieve the Sustainable Development Goals are thus complementary and mutually reinforcing.

Goal 4 of the agenda for sustainable development is aimed at ensuring inclusive and equitable quality education and to promote lifelong learning opportunities for all. The entrapment of young people in both drug use and the illicit drug trade itself poses distinct barriers in the development of individuals and communities. Strategies to break the cycle of vulnerability of young people through science-based effective prevention, and to provide young people with the skills, education and opportunities relevant for legitimate employment, can address that goal.

Goal 5 of the agenda for sustainable development is aimed at achieving gender equality and empowering all women and girls. To achieve this goal, strategies to counter the world drug problem need to consider the special needs of women and the great level of stigmatization that they endure. Prevention programmes, treatment interventions for drug use disorders and alternative development programmes, as well as the criminal justice response to drug related offences, need to be gender sensitive.

Preventing drug use and the adverse health consequence of drug use among young people requires a culture of understanding, underpinned by scientific research

Not all young people are equally vulnerable to substance use, and once drug use has been initiated, not all young people are equally vulnerable to the development of drug use disorders. In many instances, risk factors associated with drug use disorders are both beyond the control of young people and preventable.

Preventing the initiation of substance use, as well as the development of substance use disorders, can be successful only if protective factors are strengthened while risk factors are attenuated or prevented. The UNODC and WHO *International Standards on Drug Use Prevention* contain a summary of the current scientific evidence on strategies that are effective in preventing substance use, including drug use; effective prevention contributing significantly to the positive engagement of young people with their families, schools and community. Prevention interventions need to start at an early age and address the developmental stage and needs of children, adolescents and young people. For young people who have initiated substance use, screening and brief interventions are effective in preventing progression to substance use disorders.

In some countries, the middle or upper socioeconomic classes are associated with "recreational" use of drugs, which may be a manifestation of their purchasing power or reflect their willingness or opportunity to experiment with drugs. While those socioeconomic groups may have a greater propensity to use drugs than lower socioeconomic groups, it is the lower socioeconomic groups that tend to pay a higher price for drug use, as they are more likely to develop drug use disorders. Poverty, along with other factors such as social exclusion and neighbourhood deprivation, can have adverse educational, health and behavioural outcomes and has major implications for the risk of both initiating drug use and developing drug use disorders.

Many of the factors influencing substance use among adolescents, such as mental health conditions and parental neglect, are also linked with other risk behaviours and health conditions, such as dropping out of school, delinquency, aggressiveness, violence and attempted suicide. Drug use prevention programmes can help prevent those risk behaviours.

Drug use treatment and HIV prevention, treatment and care should be tailored to the specific needs of women

The majority of people who use drugs are men, but women have specific drug use patterns, as they internalize traumatic experiences in childhood differently from men, have different psychiatric comorbidities and have specific needs when it comes to treatment and other public health services related to drug use disorders.

The UNODC and WHO *International Standards for the Treatment of Drug Use Disorders* and the WHO *Guidelines for the Identification and Management of Substance Use and Substance Use Disorders in Pregnancy* describe how the specific issues and needs of women in treatment and in the community can be addressed. These include treatment of medical and psychiatric comorbidities, responding to domestic violence and sexual abuse, addressing needs during pregnancy and sexual and reproductive health and providing child care, social support and social care. Treatment programmes can be effective for women if they are tailored to women's needs in all aspects of design and delivery, including location, staffing, child-friendliness and content. Furthermore, a guide published by UNODC, entitled *Addressing the Specific Needs of Women Who Inject Drugs: Practical Guide for Service Providers on Gender-Responsive HIV Services*, supports efforts to address the specific needs of women who inject drugs.

Crime prevention and criminal justice professionals need to recognize the distinctive needs and particular backgrounds of women

When women are brought into contact with the criminal justice system, it is often for drug-related offences. In terms of sentencing, a higher proportion of women than men are sentenced for drug-related offences. As the criminal justice system is predominantly designed to deal with male offenders, it is often ill equipped to address women's

particular backgrounds (for example, care-providing responsibilities, history of violence or specific mental health-care needs) and women may be placed in a situation of vulnerability and face gender-based stereotypes, stigma and social exclusion. Given the disproportionate increase in the imprisonment of women for drug-related offences, sentencing should be matched with gender-sensitive alternatives to conviction or punishment in appropriate cases, in line with the United Nations Rules for the Treatment of Women Prisoners and Non-custodial Measures for Women Offenders (the Bangkok Rules). The flexibility inherent in the international drug control conventions should, to the maximum extent possible, be used to offer individuals (men, women and children) with drug use disorders the possibility to choose treatment as an alternative to conviction or punishment. The UNODC and WHO handbook entitled *Treatment and Care for People with Drug Use Disorders in Contact with the Criminal Justice System* contains good practices in this field.

Women are often more adversely affected by being incarcerated than men. Prior to going to prison they may have been subject to physical and sexual abuse to a greater extent than men and may suffer more than men from drug use disorders and psychiatric conditions such as post-traumatic stress disorder. Women may also suffer the additional psychological burden of not fulfilling the traditional role of care providers and, when released, may be subject to greater stigma than men and lose any social support that could help them settle in the community.

Women prisoners typically have requirements that are very different to those of men. As outlined in the UNODC *Handbook on Women and Imprisonment*, prison management should be gender-sensitive. The recognition of women's needs should be reflected in the management ethos of prisons that house female inmates, with the management style, assessment and classification, programmes offered and health care being adapted accordingly. Consideration should also be given to the treatment of female prisoners with children. Prisons should adhere to the Bangkok Rules.

Providing for the special needs of women in the criminal justice system for drug-related offences is not discriminatory but essential.

Crime prevention and criminal justice professionals also need to recognize the distinctive needs of children

The international legal framework in the area of children's rights, including the Convention on the Rights of the Child and the United Nations Model Strategies and Practical Measures on the Elimination of Violence against Children in the Field of Crime Prevention and Criminal Justice, are benchmarks for action targeting children who have substance use problems or who have committed drug-related criminal offences and are in contact with the criminal justice system. The specific vulnerabilities and needs of children who come into contact with the criminal justice system and who have substance use issues need to be addressed. Violence against children and the abuse of children suffering from drug use disorders need to be prevented, while ensuring that treatment and support is offered to detained children that takes into account their needs, according to age, sex and other factors.

More research is needed to help understand the role of women and young people in drug supply

Research on the role of women and young people in the drug supply chain is very scarce. There is a paucity of research on the involvement of women and young people in drug cultivation, production and trafficking. While data and analysis on the drug supply chain are more widely available at the international level than those on drug use, the vast majority of information available is not age- or sex-disaggregated. There is a need to systematize, across all data collection and research, a gender- and age-sensitive approach in order to ensure the availability of evidence for establishing gender- and age-sensitive drug policies.

Growing complexity requires research, investment and innovation

The coexistence on the illicit drug market of established drugs, NPS, prescription drugs diverted from licit channels and a growing stream of substances of unclear origin that are sold as medicines but are destined for non-medical use, together with polydrug use, polydrug trafficking and the darknet as a marketplace for drugs, is adding unprecedented levels of complexity to the drug problem.

Such complexity poses a number of challenges to the development of appropriate responses. Isolated actions focusing on single substances or single responses to the drug problem become ineffective or counterproductive if the interconnectivity between drug markets and different types of interventions are not well understood and taken into account. In general, most evidence-based prevention is not substance-specific, as it targets general vulnerability factors. In addition, with users consuming a wide range of substances, some of which may be new on the market, treatment services need to be multidimensional and multisectoral. Integrating programmes for polysubstance use disorders into public health responses helps to better meet the needs of users. Forensic and toxicology laboratories and law enforcement agencies can be successful in their analysis and actions only if they adopt new methods and more sophisticated instruments that can better capture the wide range of psychoactive substances on the market and the modi operandi employed by traffickers. With the primary objective of protecting the health of humankind and maximizing access to necessary medications, innovative strategies and operational interventions are needed to respond to the continuing emergence of NPS not yet under control, as well as of new illicitly supplied medicines for non-medical use.

Most of the current instruments for monitoring drug issues at the national and international levels were not designed to capture the new complexity of the global drug market. Current systems tend to focus on limited aspects of drug use and supply that underestimate the magnitude of the interlinkages between the use of established drugs, the non-medical use of prescription medicines and other psychoactive substances. Early warning systems can help to monitor the growing complexity and move towards a proactive approach. Countries with limited resources require assistance to collect and analyse the most basic information. The international data-collection system, which uses the UNODC annual report questionnaire as a basis, also needs to capture the new reality better in order to ensure that the international community maintains a grasp on the multifaceted drug problem.

GLOSSARY

amphetamine-type stimulants — a group of substances composed of synthetic stimulants controlled under the Convention on Psychotropic Substances of 1971 and from the group of substances called amphetamines, which includes amphetamine, methamphetamine, methcathinone and the "ecstasy"-group substances (3,4-methylenedioxymethamphetamine (MDMA) and its analogues).

amphetamines — a group of amphetamine-type stimulants that includes amphetamine and methamphetamine.

annual prevalence — the total number of people of a given age range who have used a given drug at least once in the past year, divided by the number of people of the given age range, and expressed as a percentage.

coca paste (or coca base) — an extract of the leaves of the coca bush. Purification of coca paste yields cocaine (base and hydrochloride).

"crack" cocaine — cocaine base obtained from cocaine hydrochloride through conversion processes to make it suitable for smoking.

cocaine salt — cocaine hydrochloride.

drug use — use of controlled psychoactive substances for non-medical and non-scientific purposes, unless otherwise specified.

new psychoactive substances — substances of abuse, either in a pure form or a preparation, that are not controlled under the Single Convention on Narcotic Drugs of 1961 or the 1971 Convention, but that may pose a public health threat. In this context, the term "new" does not necessarily refer to new inventions but to substances that have recently become available.

opiates — a subset of opioids comprising the various products derived from the opium poppy plant, including opium, morphine and heroin.

opioids — a generic term applied to alkaloids from opium poppy (opiates), their synthetic analogues (mainly prescription or pharmaceutical opioids) and compounds synthesized in the body.

problem drug users — people who engage in the high-risk consumption of drugs; for example, people who inject drugs, people who use drugs on a daily basis and/or people diagnosed with drug use disorders (harmful use or drug dependence), based on clinical criteria as contained in the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association, or the International Classification of Diseases and Related Health Problems (tenth revision) of the World Health Organization.

people who suffer from drug use disorders/people with drug use disorders — a subset of people who use drugs. People with drug use disorders need treatment, health and social care and rehabilitation. Harmful use of substances and dependence are features of drug use disorders.

harmful use of substances — defined in the International Statistical Classification of Diseases and Related Health Problems (tenth revision) as a pattern of use that causes damage to physical or mental health.

dependence — defined in the International Statistical Classification of Diseases and Related Health Problems (tenth revision) as a cluster of physiological, behavioural and cognitive phenomena in which the use of a substance or a class of substances takes on a much higher priority for a given individual than other behaviours that once had greater value. A central descriptive characteristic of dependence syndrome is the desire (often strong, sometimes overpowering) to take psychoactive drugs.

substance or drug use disorders — the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association also refers to "drug or substance use disorder" as patterns of symptoms resulting from the use of a substance despite experiencing problems as a result of using substances. Depending on the number of symptoms identified, substance use disorder may vary from moderate to severe.

prevention of drug use and treatment of drug use disorders — the aim of "prevention of drug use" is to prevent or delay the initiation of drug use, as well as the transition to drug use disorders. Once a person develops a drug use disorder, treatment, care and rehabilitation are needed.

REGIONAL GROUPINGS

The World Drug Report uses a number of regional and subregional designations. These are not official designations, and are defined as follows:

- East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, Uganda and United Republic of Tanzania
- North Africa: Algeria, Egypt, Libya, Morocco, South Sudan, Sudan and Tunisia
- Southern Africa: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe
- West and Central Africa: Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone and Togo
- Caribbean: Antigua and Barbuda, Bahamas, Barbados, Bermuda, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines and Trinidad and Tobago
- Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama
- North America: Canada, Mexico and United States of America
- South America: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela (Bolivarian Republic of)
- Central Asia and Transcaucasia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- East and South-East Asia: Brunei Darussalam, Cambodia, China, Democratic People's Republic of Korea, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Singapore, Thailand, Timor-Leste and Viet Nam
- South-West Asia: Afghanistan, Iran (Islamic Republic of) and Pakistan
- Near and Middle East: Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, United Arab Emirates and Yemen
- South Asia: Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka
- Eastern Europe: Belarus, Republic of Moldova, Russian Federation and Ukraine
- South-Eastern Europe: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, Romania, Serbia, the former Yugoslav Republic of Macedonia and Turkey
- Western and Central Europe: Andorra, Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom of Great Britain and Northern Ireland
- Oceania: Australia, Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu and small island territories

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Following last year's 20th anniversary edition, the *World Drug Report 2018* is again presented in a special five-booklet format designed to enhance reader friendliness while maintaining the wealth of information contained within.

Booklet 1 summarizes the content of the four subsequent substantive booklets and presents policy implications drawn from their findings. Booklet 2 provides a global overview of the latest estimates of and trends in the supply, use and health consequences of drugs. Booklet 3 examines current estimates of and trends in the cultivation, production and consumption of the three plant-based drugs (cocaine, opiates and cannabis), reviews the latest developments in cannabis policies and provides an analysis of the global synthetic drugs market, including new psychoactive substances. Booklet 4 looks at the extent of drug use across age groups, particularly among young and older people, by reviewing the risks and vulnerabilities to drug use in young people, the health and social consequences they experience and their role in drug supply, as well as highlighting issues related to the health care needs of older people who use drugs. Finally, Booklet 5 focuses on the specific issues related to drug use among women, including the social and health consequences of drug use and access to treatment by women with drug use disorders; it also discusses the role played by women in the drug supply chain.

Like all previous editions, the *World Drug Report 2018* is aimed at improving the understanding of the world drug problem and contributing towards fostering greater international cooperation for countering its impact on health and security.

The statistical annex is published on the UNODC website:
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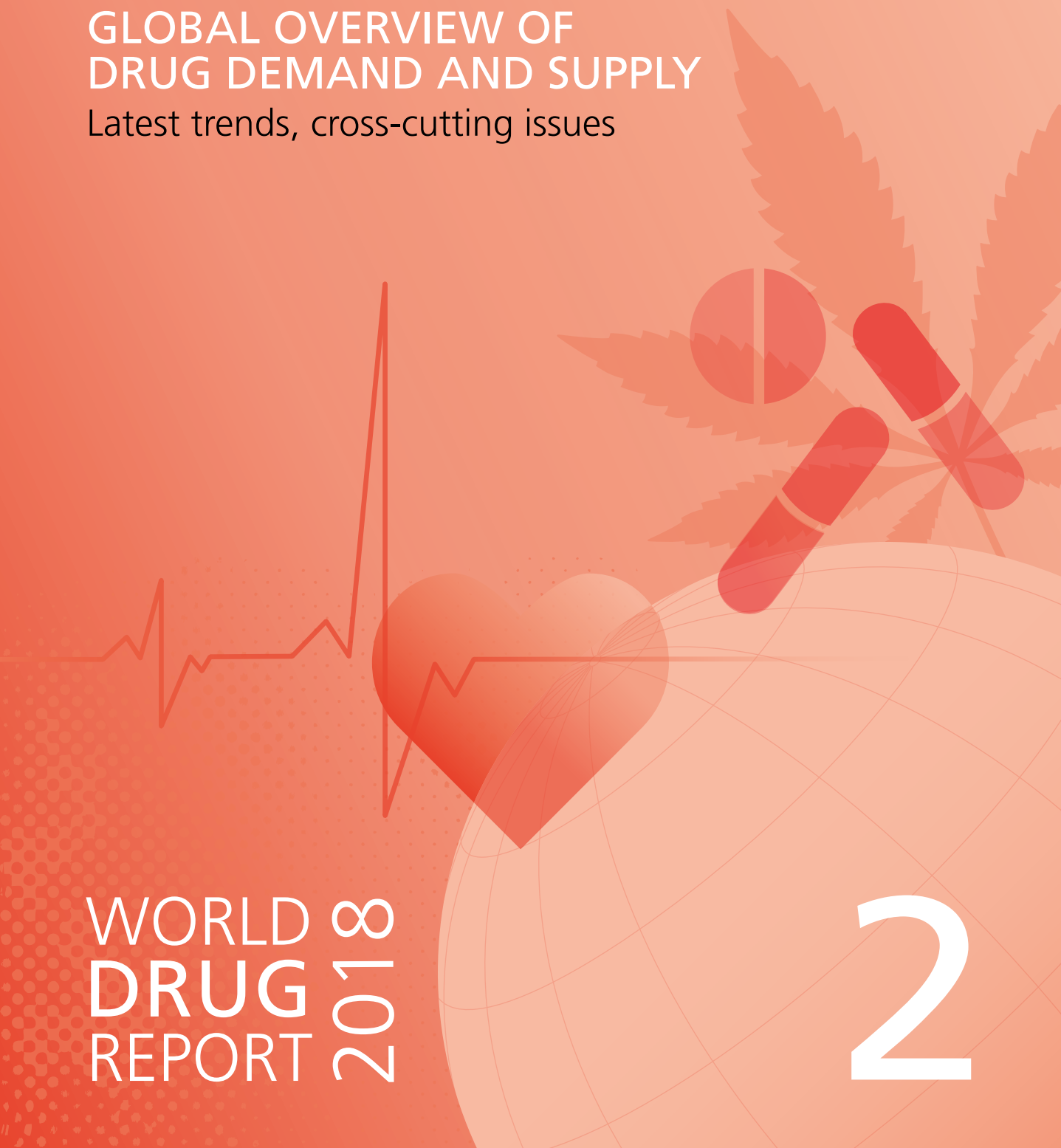
UNODC Research

GLOBAL OVERVIEW OF DRUG DEMAND AND SUPPLY

Latest trends, cross-cutting issues



WORLD DRUG REPORT 2018

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PREFACE

Both the range of drugs and drug markets are expanding and diversifying as never before. The findings of this year's *World Drug Report* make clear that the international community needs to step up its responses to cope with these challenges.

We are facing a potential supply-driven expansion of drug markets, with production of opium and manufacture of cocaine at the highest levels ever recorded. Markets for cocaine and methamphetamine are extending beyond their usual regions and, while drug trafficking online using the darknet continues to represent only a fraction of drug trafficking as a whole, it continues to grow rapidly, despite successes in shutting down popular trading platforms.

Non-medical use of prescription drugs has reached epidemic proportions in parts of the world. The opioid crisis in North America is rightly getting attention, and the international community has taken action. In March 2018, the Commission on Narcotic Drugs scheduled six analogues of fentanyl, including carfentanil, which are contributing to the deadly toll. This builds on the decision by the Commission at its sixtieth session, in 2017, to place two precursor chemicals used in the manufacture of fentanyl and an analogue under international control.

However, as this *World Drug Report* shows, the problems go far beyond the headlines. We need to raise the alarm about addiction to tramadol, rates of which are soaring in parts of Africa. Non-medical use of this opioid painkiller, which is not under international control, is also expanding in Asia. The impact on vulnerable populations is cause for serious concern, putting pressure on already strained health-care systems.

At the same time, more new psychoactive substances are being synthesized and more are available than ever, with increasing reports of associated harm and fatalities.

Drug treatment and health services continue to fall short: the number of people suffering from drug use disorders who are receiving treatment has remained low, just one in six. Some 450,000 people died in 2015 as a result of drug use. Of those deaths, 167,750 were a direct result of drug use disorders, in most cases involving opioids.

These threats to health and well-being, as well as to security, safety and sustainable development, demand an urgent response.

The outcome document of the special session of the General Assembly on the world drug problem held in 2016 contains more than 100 recommendations on promoting evidence-based prevention, care and other measures to address both supply and demand.

We need to do more to advance this consensus, increasing support to countries that need it most and improving international cooperation and law enforcement capacities to dismantle organized criminal groups and stop drug trafficking.

The United Nations Office on Drugs and Crime (UNODC) continues to work closely with its United Nations partners to assist countries in implementing the recommendations contained in the outcome document of the special session, in line with the international drug control conventions, human rights instruments and the 2030 Agenda for Sustainable Development.

In close cooperation with the World Health Organization, we are supporting the implementation of the *International Standards on Drug Use Prevention* and the international standards for the treatment of drug use disorders, as well as the guidelines on treatment and care for people with drug use disorders in contact with the criminal justice system.

The World Drug Report 2018 highlights the importance of gender- and age-sensitive drug policies, exploring the particular needs and challenges of women and young people. Moreover, it looks into

increased drug use among older people, a development requiring specific treatment and care.

UNODC is also working on the ground to promote balanced, comprehensive approaches. The Office has further enhanced its integrated support to Afghanistan and neighbouring regions to tackle record levels of opiate production and related security risks. We are supporting the Government of Colombia and the peace process with the Revolutionary Armed Forces of Colombia (FARC) through alternative development to provide licit livelihoods free from coca cultivation.

Furthermore, our Office continues to support efforts to improve the availability of controlled substances for medical and scientific purposes, while preventing misuse and diversion – a critical challenge if we want to help countries in Africa and other regions come to grips with the tramadol crisis.

Next year, the Commission on Narcotic Drugs will host a high-level ministerial segment on the 2019 target date of the 2009 Political Declaration and Plan of Action on International Cooperation towards an Integrated and Balanced Strategy to Counter the World Drug Problem. Preparations are under way. I urge the international community to take this opportunity to reinforce cooperation and agree upon effective solutions.

Yury Fedotov
Executive Director
United Nations Office on Drugs and Crime

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EXPLANATORY NOTES

The boundaries and names shown and the designations used on maps do not imply official endorsement or acceptance by the United Nations. A dotted line represents approximately the line of control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Disputed boundaries (China/India) are represented by cross-hatch owing to the difficulty of showing sufficient detail.

The designations employed and the presentation of the material in the *World Drug Report* do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities or concerning the delimitation of its frontiers or boundaries.

Countries and areas are referred to by the names that were in official use at the time the relevant data were collected.

All references to Kosovo in the *World Drug Report,* if any, should be understood to be in compliance with Security Council resolution 1244 (1999).

Since there is some scientific and legal ambiguity about the distinctions between "drug use", "drug misuse" and "drug abuse", the neutral terms "drug use" and "drug consumption" are used in the *World Drug Report*. The term "misuse" is used only to denote the non-medical use of prescription drugs.

All uses of the word "drug" in the *World Drug Report* refer to substances controlled under the international drug control conventions.

All analysis contained in the World Drug Report is based on the official data submitted by Member States to the United Nations Office on Drugs and Crime through the annual report questionnaire unless indicated otherwise.

The data on population used in the *World Drug Report* are taken from: *World Population Prospects: The 2017 Revision* (United Nations, Department of Economic and Social Affairs, Population Division).

References to dollars ($) are to United States dollars, unless otherwise stated.

References to tons are to metric tons, unless otherwise stated.

The following abbreviations have been used in the present booklet:

ATS	amphetamine-type stimulants
EMCDDA	European Monitoring Centre for Drugs and Drug Addiction
Europol	European Union Agency for Law Enforcement Cooperation
HBV	hepatitis B virus
HCV	hepatitis C virus
HIV	human immunodeficiency virus
LSD	lysergic acid diethylamide
NPS	new psychoactive substances
PWID	people who inject drugs
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNODC	United Nations Office on Drugs and Crime
WHO	World Health Organization

KEY FINDINGS

Drug use is associated with significant adverse health consequences

About 275 million people worldwide, which is roughly 5.6 per cent of the global population aged 15–64 years, used drugs at least once during 2016. Some 31 million people who use drugs suffer from drug use disorders, meaning that their drug use is harmful to the point where they may need treatment. Opioids continue to cause the most harm, accounting for 76 per cent of deaths where drug use disorders were implicated. PWID — some 10.6 million worldwide in 2016 — endure the greatest health risks. More than half of them live with hepatitis C, and one in eight live with HIV.

Number of deaths associated with the use of drugs remains high

Roughly 450,000 people died as a result of drug use in 2015, according to WHO. Of those deaths, 167,750 were directly associated with drug use disorders (mainly overdoses). The rest were indirectly attributable to drug use and included deaths related to HIV and hepatitis C acquired through unsafe injecting practices.

Overdose deaths from the non-medical use of pharmaceutical opioid use reach epidemic proportions in North America

In 2015 and 2016, for the first time in half a century, life expectancy in the United States of America declined for two consecutive years. A key factor was the increase in unintentional injuries, which include overdose deaths.

In 2016, 63,632 people died from a drug overdose in the United States, the highest number on record and a 21 per cent increase from the previous year. This was largely due to a rise in deaths associated with pharmaceutical opioids, including fentanyl and fentanyl analogues. This group of opioids, excluding methadone, was implicated in 19,413 deaths in the country, more than double the number in 2015. Evidence suggests that Canada is also affected, with a large number of overdose deaths involving fentanyl and its analogues in 2016.

Outside North America, with the exception of Estonia, the impact of fentanyl and its analogues is relatively low.

Many countries still fail to provide adequate drug treatment and health services to reduce the harm caused by drugs

One in six people suffering from drug use disorders received treatment for those disorders during 2016, which is a relatively low proportion that has remained constant in recent years.

Some of the most adverse health consequences of drug use are experienced by PWID. A global review of services aimed at reducing adverse health consequences among PWID has suggested that only 79 countries have implemented both needle and syringe programmes and opioid substitution therapy. Only four countries were classified as having high levels of coverage of both of those types of interventions.

Information on the availability of HIV testing and counselling and antiretroviral therapy remains sparse: only 34 countries could confirm the availability of HIV-testing programmes for PWID, and 17 countries confirmed that they had no such programmes. There was no information on the availability of antiretroviral therapy for 162 countries.

Witnessing an overdose and experiencing a non-fatal overdose are common

Witnessing an overdose is common among those who use heroin and/or cocaine and who inject drugs. This provides an opportunity to intervene and influence the outcome of the situation (for example, in the administration of naloxone in the case of opioid overdose) and whether it proves to be fatal.

Many people who use heroin and/or cocaine and who inject drugs also report that they have

experienced a non-fatal overdose. Non-fatal overdoses can leave drug users with significant health problems and have also been shown to be associated with a subsequent fatal overdose, with the risk of death increasing with the number of prior non-fatal overdoses.

Prisoners are at higher risk for infectious diseases but are poorly served

People in prison and other closed settings are at a much greater risk of contracting infections such as tuberculosis, HIV and hepatitis C than the general population, but access to treatment and prevention programmes is often lacking. Even where such programmes are available, they are not necessarily of the same standard as those provided in the community. The lack of access to prevention measures in many prisons can result in the rapid spread of HIV and other infections.

People who use heroin are exposed to a severe risk of death from overdose after release from prison, especially in the first two weeks. Such deaths are related to a lowered tolerance to the effects of heroin use developed after periods of relative abstinence, including during incarceration. However, released prisoners are rarely able to access overdose management interventions, including prevention medications such as naloxone, or treatment for substance dependence, including methadone.

Afghan opium poppy cultivation drives record opiate production

Total global opium production jumped by 65 per cent from 2016 to 2017, to 10,500 tons, easily the highest estimate recorded by UNODC since it started estimating global opium production at the beginning of the twenty-first century. The total area under opium poppy cultivation worldwide increased to almost 420,000 ha in 2017. More than 75 per cent of that area is in Afghanistan.

Overall seizures of opiates rose by almost 50 per cent from 2015 to 2016. The quantity of heroin seized globally reached a record high of 91 tons in 2016. Most opiates were seized near the manufacturing hubs in Afghanistan.

A notable increase has been seen in cocaine manufacture

Global cocaine manufacture in 2016 reached its highest level ever: an estimated 1,410 tons. After falling during the period 2005–2013, global cocaine manufacture rose by 56 per cent during the period 2013–2016. The increase from 2015 to 2016 was 25 per cent. The total area under coca cultivation worldwide in 2016 was 213,000 ha, almost 69 per cent of which was in Colombia.

Global seizures are still dominated by cannabis but sharp increases are reported for other drugs

Despite declining in 2016, cannabis continues to be the drug seized in the greatest quantities worldwide, followed by coca/cocaine-related substances and opioids. Both the quantity of ATS and of cocaine seized worldwide reached a record level in 2016. The sharpest increases in the quantities of drugs intercepted worldwide in 2016 were reported for plant-based NPS, which rose sevenfold, mainly due to seizures of kratom. The quantity of synthetic NPS seized worldwide, by contrast, saw a marked decline of more than 50 per cent in 2016, mainly due to a decline in the quantities of phenetalyamines and synthetic cannabinoids seized.

Effect of the crackdown on darknet drug dealers is not yet clear

In July 2017, police forces from several countries worked together to take down the largest drug-trading platform on the darknet, the part of the "deep web" containing information that is only accessible using special web browsers. Before it was closed, AlphaBay had featured more than 250,000 listings for illegal drugs and chemicals. It had had over 200,000 users and 40,000 vendors during its existence. The authorities also succeeded in taking down the trading platform Hansa, described as the third largest criminal marketplace on the dark web.

It is not yet clear what effect the closures will have. According to an online survey in January 2018, 15 per cent of those who had used darknet sites for purchasing drugs said that they had used such markets less frequently since the closures, and 9 per cent said they had completely stopped. However, more than half did not consider themselves to have been affected by the closures.

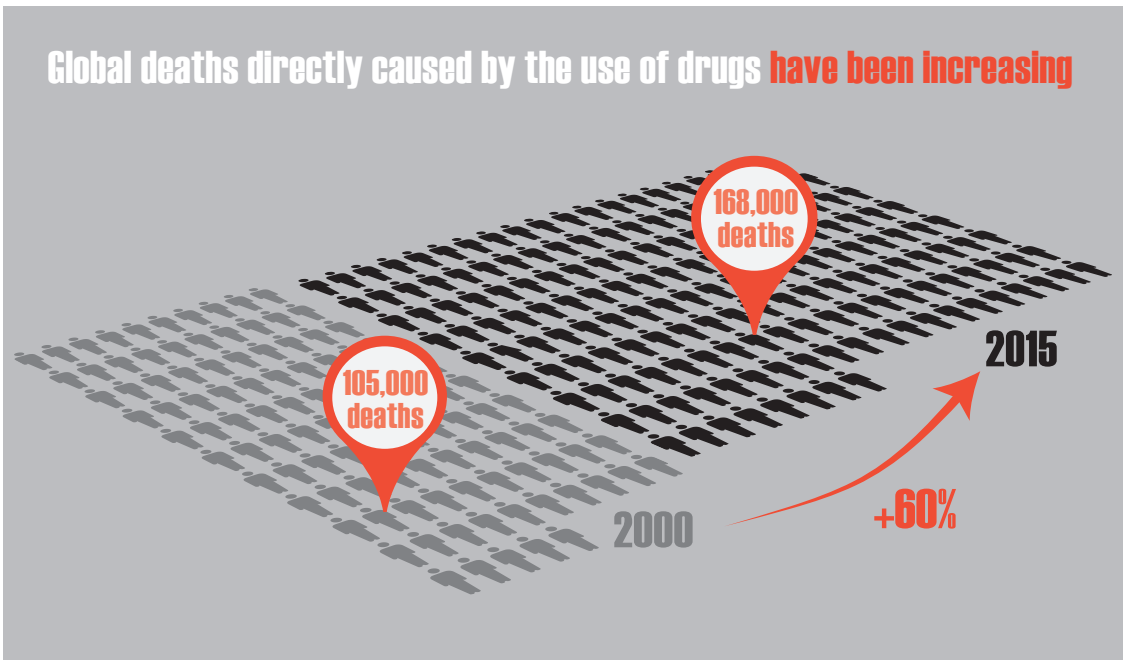
Although the scale of drug trafficking on the darknet remains limited, it has shown signs of rapid

growth. Authorities in Europe estimated that drug sales on the darknet from 22 November 2011 to 16 February 2015 amounted to roughly $44 million per year. However, a later study estimated that, in early 2016, drug sales on the darknet were between $14 million and $25 million per month, equivalent to between $170 million and $300 million per year.

INTRODUCTION

This booklet constitutes the second part of the *World Drug Report 2018*. It provides a global overview of the latest estimates of and trends in drug use and drug supply, as well as of several cross-cutting issues related to the world drug problem. Such issues comprise the health impact of drug use, including trends in drug use disorders, problem drug use as reflected in treatment demand and estimates of the number of people who inject drugs (PWID) and of those living with HIV and hepatitis.

The present booklet also examines the global extent of deaths attributable to drug use, with recent trends in overdose deaths in some countries being presented as illustrative. Information on witnessing an overdose or personally experiencing a non-fatal overdose is also presented. A review of the availability and levels of coverage of core interventions (particularly needle and syringe programmes and opioid substitution therapy) to help prevent the spread of HIV and HCV among PWID is also included. Finally, the booklet contains a global overview of the latest estimates of and trends in cultivation, production and trafficking of illicit drugs, including on the Internet, using the darknet.



Source: UNODC analysis based on WHO, Disease burden and mortality estimates, Global Health Estimates 2015: deaths by cause, age, sex, by country and by region, 2000–2015.

A. EXTENT OF DRUG USE

More than a quarter of a billion people use drugs globally

It is estimated that in 2016 some 275 million people worldwide had used drugs at least once in the previous year (range: 204 million to 346 million). Corresponding to 5.6 per cent of the global population aged 15–64 years (range: 4.2 to 7.1 per cent), or approximately 1 of every 18 people. The actual number of people who use drugs increased by 20 million people from 2015 to 2016. This change is the consequence of an increase in the global number of cannabis users and, to a lesser extent, changes in the methodology used to produce this estimate.[1] However, caution is required in interpreting trends because of the wide uncertainty intervals for the estimates.

Some 31 million people worldwide suffer from drug use disorders

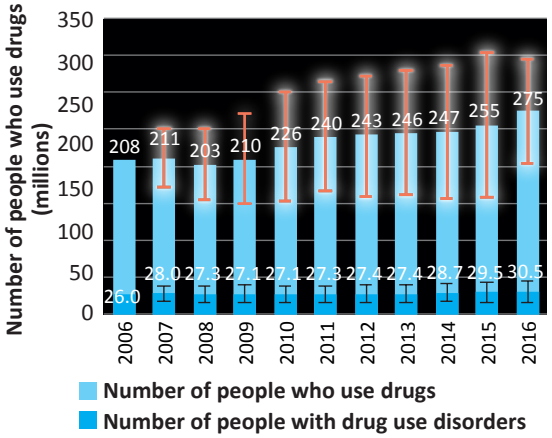
Of concern is the fact that an estimated one in nine people who use drugs (11 per cent) suffer from drug use disorders, meaning that their drug use is harmful to the point where they may experience drug dependence and/or require treatment. This amounted to an estimated 30.5 million people worldwide in 2016 (range: 16.7 million to 44.4 million), or 0.62 per cent (range: 0.34 to 0.91 per cent) of the global population aged 15–64 years. An increase of 1 million people from 2015 to 2016, this mainly reflects a global increase in the number of users of opiates, as well as an increase in the number of users of cocaine.

Evidence of increasing cannabis use in some subregions

Cannabis remained by far the most widely consumed drug worldwide in 2016, with 192.2 million past-year users, corresponding to 3.9 per cent of the global population aged 15–64 years. High annual prevalence rates of cannabis use continue in West and Central Africa (13.2 per cent), North America (12.9 per cent) and Oceania (11.0 per cent). Experts in many countries in Africa and Asia perceived an increase in cannabis use, although there is a lack of information on the extent of drug use based on national surveys in most countries in those two regions and more evidence is needed. Cannabis use also continues to increase in North America, and many countries in Latin America also report an increase in use. Cannabis use remains high in Western and Central Europe, with use stabilizing in high-prevalence countries, while several other countries that historically have had a low prevalence of cannabis use are now reporting an increase.

1 See the online methodology section of the present report.

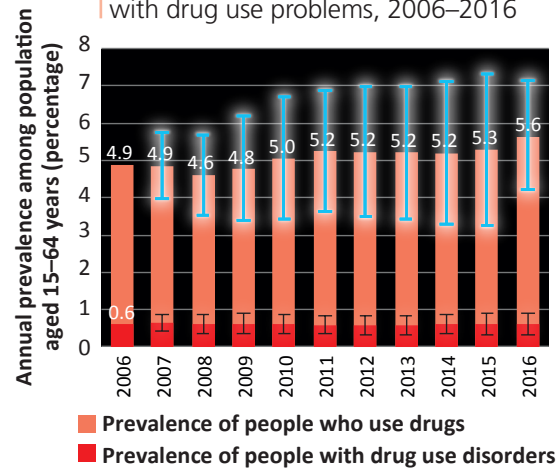
FIG. 1 Global trends in estimated number of people who use drugs, 2006–2016



Source: UNODC, responses to the annual report questionnaire.

Note: Estimates are for adults (aged 15–64 years) who used drugs in the past year.

FIG. 2 Global trends in the estimated annual prevalence of drug use and people with drug use problems, 2006–2016

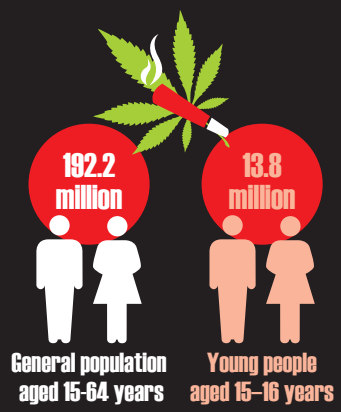


Source: UNODC, responses to the annual report questionnaire.

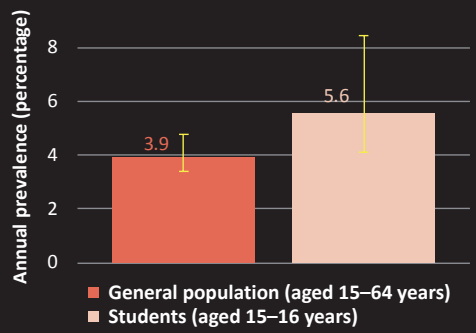
Note: Estimated percentage of adults (aged 15–64 years) who used drugs in the past year.

Cannabis use among young people

In most countries, cannabis is the drug most widely used, both among the general population and among youth. A global estimate, produced for the first time by UNODC, based on available data from 130 countries, suggests that in 2016 13.8 million young people (mostly students) aged 15–16 years used cannabis at least once over the previous 12 months, equivalent to 5.6 per cent of the population in this age range. Annual use of cannabis in 15–16 year old people was slightly higher than among the general population aged 15–64 years (3.9 per cent in 2016). However, caution is required as error margins around these two estimates overlap.



Global annual prevalence of cannabis use among the general population, aged 15–64 years and among students aged 15–16 years, 2016



Sources: UNODC, annual report questionnaire data and other government reports.

Note: the estimate of cannabis use in the last year in young people aged 15–16 years is based on school surveys in most countries, thus the use of the term 'students'.

In most countries, cannabis is the most widely used drug, both among the general population and among young people. A global estimate, produced for the first time by UNODC, based on available data from 130 countries, suggests that, in 2016, 13.8 million young people (mostly students) aged 15–16 years used cannabis at least once in the previous 12 months, equivalent to 5.6 per cent of the population in that age range. Annual use of cannabis in 15-16 year old people was slightly higher than among the general population aged 15-64 years (3.9 per cent in 2016). However, caution is required as error margins around these two estimates overlap.

Opioids are responsible for most of the negative health impact of drug use

While cannabis is the most widely used drug globally, opioids are responsible for most of the negative health impact of drug use. For example, opioids accounted for 76 per cent of deaths from drug use disorders in 2015.[2] There were an estimated 34.3 million past-year users of opioids (persons who use opiates and persons who use prescription opioids for non-medical purposes) globally in 2016, corresponding to 0.7 per cent of the global population aged 15–64 years. The prevalence of past-year use of opioids among the population aged 15–64 years is high in North America (4.2 per cent) and Oceania (2.2 per cent). Among users of opioids, 19.4 million were past-year users of opiates (heroin and opium), corresponding to 0.4 per cent of the population aged 15–64 years, with high prevalence rates of past-year use of opiates in Central Asia and Transcaucasia (0.9 per cent), Eastern and South-Eastern Europe (0.7 per cent) and North America (0.8 per cent).

Misuse of pharmaceutical opioids is a growing concern

The misuse of pharmaceutical opioids such as tramadol is reported in many countries in Africa (particularly West and North Africa) and in some countries of the Near and Middle East. This is reflected in the number of people in treatment for tramadol-related problems and the number of tramadol overdose deaths reported in some countries. The high level of misuse of pharmaceutical opioids remains a major concern in North America, a subregion that has seen a resurgence in heroin use in the past four years, particularly in the United States of America. Coupled with the use of fentanyl and its analogues, the interlinked epidemic of

2 WHO, Disease burden and mortality estimates, Global Health Estimates 2015: deaths by cause, age, sex, by country and by region, 2000–2015. Available at www.who.int/.

prescription opioids and heroin has taken a heavy toll, especially in terms of the high number of reported fatal overdoses associated with their use. There are also increasing signs of misuse of pharmaceutical opioids in Western and Central Europe, as reflected, for example, in the increasing proportion of people entering treatment services for non-medical use of pharmaceutical opioids in the subregion. While not at the same level as in North America, overdose deaths related to fentanyl and its analogues have also been reported in Western and Central Europe.

Amphetamines are one of the most worrying threats of drug use in East and South-East Asia

In 2016, an estimated 34.2 million people worldwide, or 0.7 cent of the population aged 15–64 years, used amphetamines in the past year. The highest annual prevalence of use of amphetamines among the population aged 15–64 years was in North America (2.0 per cent), followed by Oceania (1.3 per cent). It is not possible to construct a specific estimate of use of amphetamines in East and South-East Asia due to the chronic lack of data in the subregion, but many countries in that subregion consider methamphetamine use to be one of the most worrying threats of drug use. There are also concerns that an increasing number of countries are reporting methamphetamine use, especially among opioid users in West Asia. "Ecstasy" is used by 0.4 per cent of the global population aged 15–64 years, but its spread across most regions has been striking in recent years, during which time there has also been an increasing trend in "ecstasy" use in Western and Central Europe, as well as Latin America.

Indications of an increase in cocaine use in the Americas

The use of cocaine remains concentrated in North America and South America, where, respectively, 1.9 per cent and 0.95 per cent of the population aged 15–64 years are past-year users, and in Oceania (1.7 per cent) and Western and Central Europe (1.2 per cent). Globally, an estimated 18.2 million people used cocaine in 2016, or 0.4 per cent of the population aged 15–64 years. There are indications of an increase in cocaine use in many countries in North and South America. In addition, the use of cocaine base paste, previously confined to cocaine-manufacturing countries, has spread to many countries in South America.

Non-medical use of benzodiazepines in combination with prescription opioids is a growing problem

While global estimates of the non-medical use of prescription drugs are not available, such misuse remains quite widespread, particularly among individuals practicing polydrug use. The non-medical use of prescription drugs such as prescription stimulants and benzodiazepines, in combination with prescription opioids, is reported to be a growing problem in many countries. Of misused prescription drugs, the non-medical use of benzodiazepines remains the most common: approximately 60 countries[3] have ranked benzodiazepines among the three most commonly misused substances, and some countries report higher prevalence rates for their use than for many other substances. Benzodiazepines are also frequently reported in fatal overdose cases involving opioids.

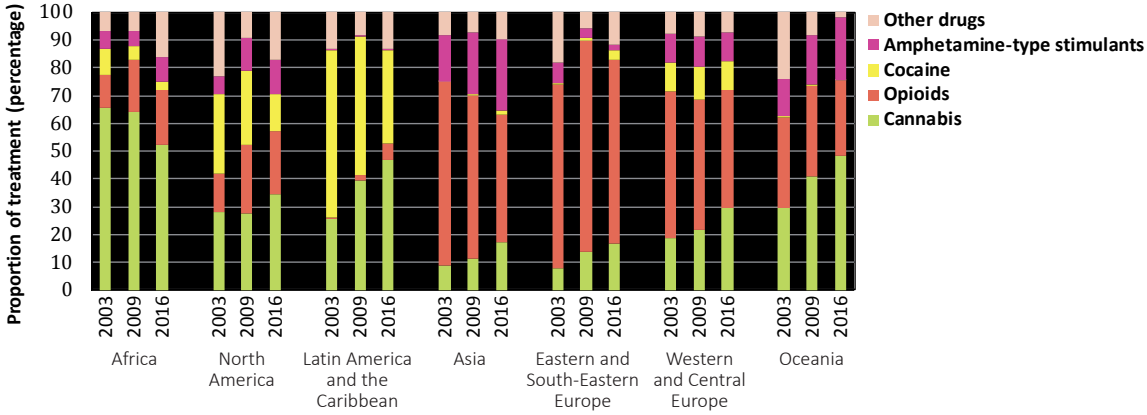
Trends in drug treatment are consistent with changing patterns of drug use in different regions

Globally, the extent to which people in need of drug treatment actually receive it remains limited. In 2016, as in previous years, an estimated one in six people who had drug use disorders received treatment. Despite limitations, information about people in treatment for drug use can provide useful insight into trends and geographical variations with respect to drug use disorders. However, this information should be interpreted with caution because treatment numbers reflect not only demand for treatment (the number of people seeking help) but also the extent of the provision of treatment (depending on government willingness to finance treatment services).

Most people in drug treatment in Africa, the Americas and Oceania are being treated for cannabis use. In all regions except Africa, an increasing proportion of the drug treatment provided is related to cannabis use. Although cannabis has consistently been the

3 Based on responses to the annual report questionnaire by Member States in 2015 and 2016.

FIG. 3 Trends in the proportion of primary drug of use in drug treatment admissions, by region, 2003, 2009 and 2016



Source: UNODC, responses to the annual report questionnaire.

most common drug of use among those receiving drug treatment in Africa, treatment for opioid use disorders is increasing in the region. This trend may be an indication that ongoing trafficking of heroin and pharmaceutical opioids in transit through Africa to other destinations has produced a worrying spillover effect on drug use within Africa. Opioids remain a major concern in Europe and Asia, especially in Eastern and South-Eastern Europe, where two of every three people in drug treatment are there for opioid use disorders.

Cocaine continues to be a drug of concern among those receiving treatment in Latin America and the Caribbean, in particular, where one third of those in treatment for drug use disorders are being treated for cocaine use, although that proportion has been declining. Cocaine use disorders are reported as the primary reason for drug treatment, albeit to a lesser extent, in North America and Western and Central Europe as well. In North America, treatment primarily for cocaine use disorders has been declining in relative importance, while the proportion of those in treatment for opioid use disorders has increased. In the United States, between 2004 and 2014, the number of admissions related primarily to the use of cocaine declined by 65 per cent, from 248,000 to 88,000 individuals, and treatment for the use of opiates increased by 51 per cent, from 323,000 to 490,000 individuals. There is a higher proportion of treatment for the use of ATS in Asia and Oceania than in other regions.

Women with drug use disorders are underrepresented in treatment

Although one in three drug users is a woman, women continue to account for only one in five people in treatment. The proportion of females in treatment tends to be higher for tranquillizers and sedatives (approximately one in three treatment admissions in most subregions of the Americas and Europe) than for other substances. This reflects the fact that although men are three times as likely to use cannabis, cocaine or amphetamines, women are more likely to use tranquillizers and sedatives for non-medical purposes. People in treatment for drug use disorders related to opioids and cocaine tend to be older: in their early thirties on average. By contrast, those in treatment for cannabis use disorders tend to be younger: in their early twenties on average.

B. HEALTH CONSEQUENCES OF DRUG USE

The main focus of this section are the health-related aspects of the use of drugs, such as injecting drug use, HIV and HCV acquired through unsafe injecting practices, as these are responsible for the greatest burden of disease, in terms of mortality and disability, associated with the use of drugs.[4, 5] While opioids

4 Institute for Health Metrics and Evaluation, Global Burden of Disease Data. Available at www.healthdata.org/.

5 5 *World Drug Report 2017* (United Nations publication, Sales No. E.17.XI.6).

Cocaine base paste in South America

Traditionally, the use of cocaine base paste had mostly been confined to Colombia and Peru, but over the past decade its use has gradually spread further south, to Argentina, Brazil, Chile and Uruguay. Cocaine base paste is a derivative of coca leaf with a high potential for harmful use and dependence. However, information on the patterns of use, health effects and options for effective treatment is currently limited.[a]

Tighter restrictions on the sale of, and access to, the chemical precursors used in the manufacture of cocaine hydrochloride is one of the reasons for the spread of the use of cocaine base paste to many countries in South America. Cocaine base paste is a derivative of coca leaf produced as an intermediate product in the preparation of cocaine hydrochloride. It is a form of "smokable cocaine" of high toxicity with a greater potential for dependence than cocaine hydrochloride, and is now a matter of concern in South America as it can cause severe psychological and physical disorders.

As is the case for treatment of all psychostimulants, there is currently no established pharmacological treatment for cocaine use disorders. Information regarding the appropriate treatment for cocaine base paste dependence is therefore limited.

[a] Antonio Pascale and others, *Cocaine Base Paste Consumption in South America: A Review of Epidemiological and Medical-Toxicological Aspects* (Washington, D. C., Organization of American States, Inter-American Drug Abuse Control Commission, 2015).

are responsible for most of the negative health impact of drug use, in regions where opioid use is less common, the use of other substances such as cocaine and amphetamines (both injecting and non-injecting use) is also associated with adverse health consequences. There is also increasing awareness of the health risks associated with the use of NPS, although in terms of the magnitude of the problem they are small. Furthermore, in many subregions, the non-medical use of benzodiazepines has been associated with overdose deaths that also involved opioids.

Almost 11 million people worldwide injected drugs in 2016

The UNODC/WHO/UNAIDS/World Bank joint estimate of the number of PWID in 2016 is 10.6 million (range: 8.3 million to 14.7 million), corresponding to 0.22 per cent (range: 0.17 to 0.30 per cent) of the global population aged 15–64 years. This estimate is based on the most recent and highest quality information currently available to UNODC. It does not imply that there has been a change in the global number of PWID compared with those published in previous editions of the *World Drug Report*. Based on data from 107 countries, the estimate covers 88 per cent of the global population aged 15–64 years.

The extent of injecting drug use is less certain or unknown in some subregions due to the paucity of data: in the Caribbean, information is available only for Puerto Rico; for all of Oceania, there are data for Australia and New Zealand only; while for Africa, data are available for countries comprising 58 per cent of the population aged 15–64 years, and for the Near and Middle East, only 17 per cent of that population.

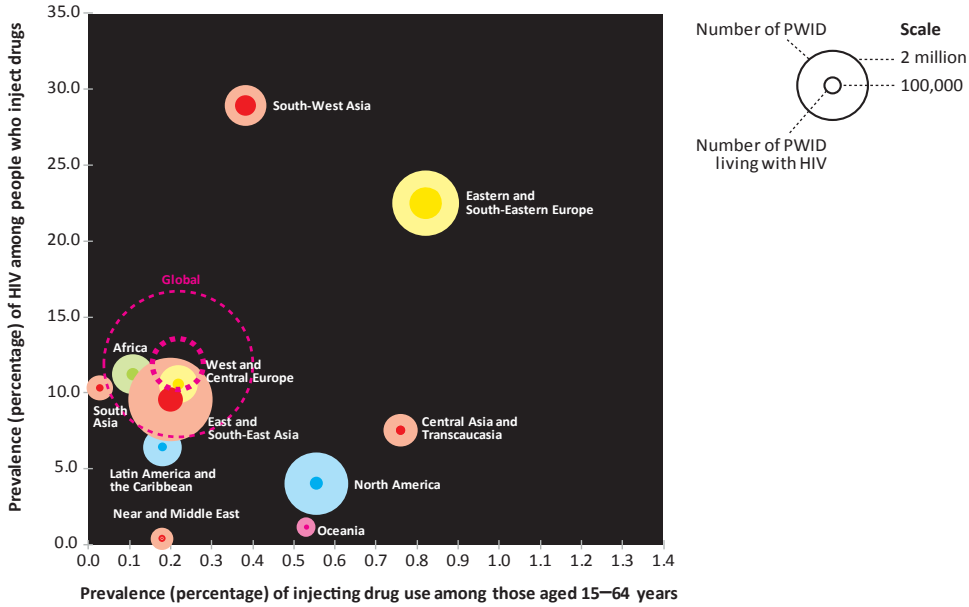
The subregions where the largest numbers of PWID reside are Eastern and South-Eastern Europe, with 17 per cent of the global total number of PWID and where the prevalence of injecting drug use is highest at 3.8 times the global average; North America, with 17 per cent of the global total of PWID and where the prevalence of injecting drug use is 2.5 times the global average; and East and South-East Asia, with 30 per cent of the global total of PWID, but where the prevalence of injecting drug use is relatively low and is below the global average.

Almost half of all PWID worldwide in 2016 were estimated to reside in just three countries: China, the Russian Federation and the United States. Although these three countries combined account for just 27 per cent of the global population aged 15–64 years, together they are home to 45 per cent of the world's PWID, an estimated 4.8 million people.

In addition to the estimates presented here, another study[6] providing national, regional and global estimates of PWID and the prevalence of HIV among PWID was published in *The Lancet Global Health* in 2017 (see the box, entitled "Injecting drug use

6 Louisa Degenhardt and others, "Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: a multistage systematic review", The Lancet Global Health, vol. 5, No. 12 (2017), pp. e1192–e1207.

FIG. 4 | Regional patterns in injecting drug use and HIV among people who inject drugs, 2016



Source: UNODC, responses to the annual report questionnaire; progress reports of UNAIDS on the global AIDS response (various years); the former Reference Group to the United Nations on HIV and Injecting Drug Use; and published peer-reviewed articles and government reports.

Note: The outer circle represents the number of PWID, and the inner circle represents the number of PWID living with HIV. Regions and subregions are coloured: green (Africa), blue (Americas), orange (Asia), yellow (Europe) and pink (Oceania). Data presented for Oceania are for Australia and New Zealand only.

and HIV: a comparison of global estimates"). That study also presented data on PWID disaggregated by gender and age and estimated that approximately one in five PWID are women and a little over one in four are younger than 25 years of age. Information on the gender disaggregation of PWID was available for 91 countries (40 countries in Europe, 21 in Asia, 6 in the Americas, 2 in Oceania and 22 in Africa) and an age breakdown for PWID was available for 72 countries (30 countries in Europe, 16 in Asia, 5 in the Americas, 1 in Oceania and 20 in Africa).

PWID are among the most marginalized and stigmatized people who use drugs. They are exposed to specific risk behaviours and risky environments and experience a broad spectrum of adverse social and health consequences. Homelessness and incarceration are common, as is engagement in risk behaviours such as casual unprotected sex, using a needle-syringe after use by someone else and involvement in sex work.[7]

7 Ibid.

Unsafe injecting practices, including the sharing of contaminated needles and syringes, is a major route for the transmission of both HIV and HCV among PWID. In addition, those who acquire HIV and HCV through unsafe injecting practices can transmit the diseases to others, for example, through sexual transmission. HCV is more readily spread than HIV through injecting. Studies among healthcare workers in the United States (using hospital data on needle-stick injury) have estimated that the probability of transmission of HCV per exposure to a contaminated syringe is between 5 and 20 times higher than for the transmission of HIV.[8]

One in eight people who inject drugs is living with HIV

Outside sub-Saharan Africa, PWID accounted for 20 per cent of new HIV infections in 2015.[9] Fur-

8 Elijah Paintsil and others, "Survival of hepatitis C virus in syringes: implication for transmission among injection drug users", Journal of Infectious Diseases, vol. 202, No. 7 (2010), pp. 984–990.

9 UNAIDS, Ending AIDS: Progress Towards the 90–90–90 Targets (Geneva, 2017).

thermore, the number of newly infected PWID worldwide each year has been on the rise, increasing by one third, from 114,000 new cases in 2011 to 152,000 cases in 2015.[10] This contrasts with the estimated 11 per cent decline in new HIV infections among adults in general (more precisely, among people aged 15 years and older) that occurred between 2010 and 2016.[11]

The joint UNODC/WHO/UNAIDS/World Bank 2016 estimate of the prevalence of HIV among PWID is 11.8 per cent, suggesting that 1.3 million PWID are living with HIV. This estimate is based on the reporting of the prevalence of HIV among PWID from 119 countries, covering 94 per cent of the estimated global number of PWID. For PWID living with HIV, co-infection with HCV is highly prevalent, at 82.4 per cent.[12]

By far the highest prevalence of HIV among PWID is in South-West Asia and in Eastern and South-Eastern Europe, with rates that are, respectively, 2.4 and 1.9 times the global average. Together, those two subregions account for 49 per cent of the total number of PWID worldwide living with HIV. Although the prevalence of HIV among PWID in East and South-East Asia is below the global average, 24 per cent of the global total of PWID living with HIV reside in that subregion. An estimated 53 per cent of PWID living with HIV worldwide in 2016 (662,000 people) resided in just three countries (China, Pakistan and the Russian Federation), which is disproportionately large compared with the percentage of the world's PWID living in those three countries (35 per cent).

Injecting drugs is a major route for transmission of the HCV virus

The burden of disease (mortality and morbidity) among PWID resulting from HCV is greater than from HIV.[13] Unsafe injecting by sharing contaminated needles and syringes is an important route for the spread of HCV worldwide. Of the total of 1.7 million new HCV infections worldwide in 2015, 23.0 per cent (390,000 people) were attributable to current injecting drug use.[14] Of deaths worldwide in 2015 due to cancer and cirrhosis of the liver associated with HCV infection, 31.5 per cent were attributable to a history of injecting drug use.[15]

HCV infection is highly prevalent among PWID, as every second PWID is living with HCV. The joint UNODC/WHO/UNAIDS/World Bank estimate for 2016 for the prevalence of HCV among PWID is 51.9 per cent; in other words, 5.5 million people who inject drugs are living with HCV. This estimate is based on the reporting of the prevalence of HCV among PWID from 96 countries, covering 91 per cent of the estimated global number of PWID.

The higher risk of the spread of HCV among PWID who are women is of particular concern. A study conducted among 1,868 PWID in Australia, Canada, the Netherlands and the United States estimated that women who inject drugs have a 38 per cent higher risk of contracting HCV than their male counterparts. This higher risk does not seem to be related to different practices in the sharing of syringes, which is a significant risk factor for HCV, but is associated with other factors, including genetic factors, and differences in access to prevention services.[16]

The joint UNODC/WHO/UNAIDS/World Bank global estimate for 2016 for the prevalence of HBV[17] among PWID is 7.5 per cent; in other words, an estimated 0.8 million PWID are living with HBV.

10 UNAIDS, Get on the Fast-Track: The Life-cycle Approach to HIV (Geneva, 2016).

11 Ending AIDS: Progress Towards the 90–90–90 Targets.

12 Lucy Platt and others, "Prevalence and burden of HCV co-infection in people living with HIV: a global systematic review and meta-analysis", *Lancet Infectious Diseases*, vol. 16, No. 7 (2016), pp. 797-808.

13 Louisa Degenhardt and others, "Estimating the burden of disease attributable to injecting drug use as a risk factor for HIV, hepatitis C, and hepatitis B: findings from the Global Burden of Disease Study 2013", *The Lancet Infectious Diseases*, vol. 16, No. 12 (2016), pp. 1385–1398.

14 WHO, Global Hepatitis Report 2017 (Geneva, 2017).

15 Ibid.

16 Aryan Esmaeili and others, "The effect of female sex on hepatitis C incidence among people who inject drugs: results from the International Multicohort InC3 Collaborative", *Clinical Infectious Diseases*, vol. 66, No. 1 (2018), pp. 20–28.

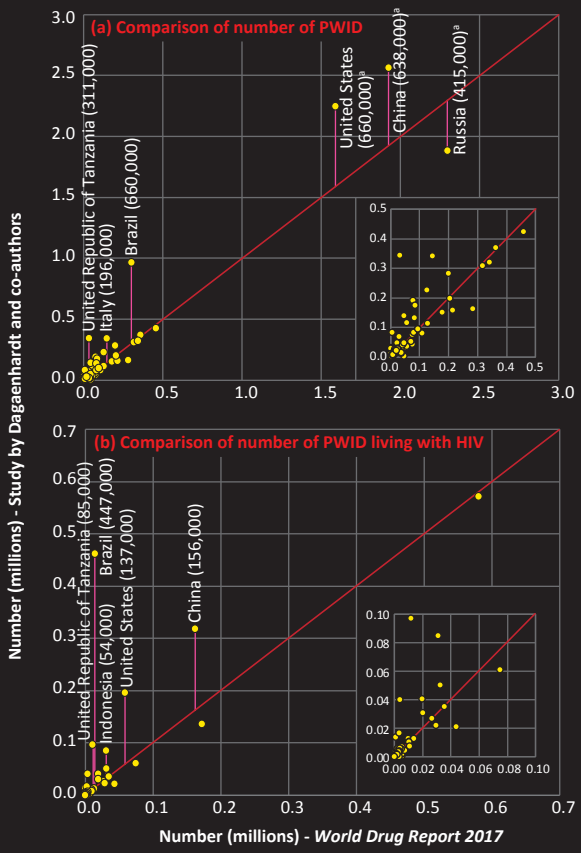
17 The HBV prevalence estimate is intended to refer to active infection (HBsAg), rather than anti-HBc, which indicates previous exposure. However, it is not always possible to differentiate that in the data reported to UNODC.

Injecting drug use and HIV: a comparison of global estimates

Given the hidden and stigmatized nature of injecting drug use, it is extremely challenging to arrive at accurate and valid population size estimates for PWID and the prevalence of HIV among PWID in a given country. Aggregating national data and producing regional and global estimates is even more challenging, given the gaps in data at the country level. Numerous methods are employed, including respondent-driven sampling, capture-recapture, the treatment multiplier or unique object multiplier methods, network-scale up, census and enumeration, and general population surveys to generate such estimates. Each method has its own advantages and disadvantages, relies on particular theoretical assumptions that may not fully reflect the real situation, may be logistically difficult to implement, or may not yet have been fully validated.[a] Estimating the prevalence of HIV among PWID is further complicated by selection bias and the difficulty of recruiting a representative sample. The prevalence of HIV among PWID can vary considerably between geographical locations within a country, thus making the calculation of a national estimate challenging.

In 2017, Degenhardt and co-authors published country, regional and global population size estimates for PWID and the prevalence of HIV among PWID.[b] Their global estimate for the number of PWID in 2015 was 3.8 million higher than the corresponding joint UNODC/WHO/UNAIDS/World Bank estimate, and their estimated number of PWID living with HIV was 1.25 million higher. The methodologies used by Degenhardt and co-authors and the joint UNODC/WHO/UNAIDS/World Bank estimates were broadly consistent. The selection of country estimates was based on a comparable grading of the quality of the available national estimates. In both cases, a population-weighted average approach was used to determine regional and global estimates and to infer estimates for countries for which no data were available. In the study by Degenhardt and co-authors, PWID population size estimates were identified for 83 countries, and the prevalence of HIV among PWID was identified for 108 countries. UNODC identified estimates of PWID population size for 107 countries and prevalence of HIV among PWID for 118 countries. Degenhardt and co-authors conducted a systematic review of peer-reviewed and grey literature before UNODC conducted an exhaustive annual search of the scientific literature for countries for which data were not reported to UNODC, or were of insufficient quality, and also conducted a global consultation with experts over the prior four years. Where multiple high-quality studies on PWID were available for a country, Degenhardt and co-authors pooled the estimates through meta-analysis. For the prevalence of HIV, if there were multiple estimates available for a given country, Degenhardt and co-authors pooled the estimates published in the four years previous to the most recent estimate available. UNODC generally selected the most recent estimates from studies of the highest quality, giving due consideration to the definition of injecting, sample size and geographical coverage.

Comparison of estimates of (a) numbers of PWID and (b) numbers of PWID living with HIV, selected countries, 2015



Source: *World Drug Report 2017* (comprising the responses to the annual report questionnaire, progress reports of UNAIDS on the global AIDS response (various years), the former Reference Group to the United Nations on HIV and Injecting Drug Use, and published peer-reviewed articles and government reports); and Louisa Degenhardt and others, "Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: a multistage systematic review", *The Lancet Global Health,* vol. 5, No. 12 (2017), pp. e1192–e1207.

Note: The estimated number of PWID and number of PWID living with HIV are for the 15–64 years age category.

[a] *The difference between the estimates produced by the two studies.*

For approximately one third of the countries (25), the PWID size estimates presented in the study by Degenhardt and co-authors were retained from the previous global systematic review published 10 years ago, in 2008.[c] PWID population size estimates were not updated for some countries that account for a large share of PWID: Brazil, China, India, Italy and the Russian

Federation. Estimates of the prevalence of HIV among PWID was included for 108 countries, using estimates retained from the 2008 review for 12 of those countries, including Brazil and Argentina.

More recent data on injecting drug use have become available for the Russian Federation, China and Italy since the 2008 review and were published in the *World Drug Report 2017*. The estimates, which used indirect methods of estimation, were officially reported to UNODC or UNAIDS but were not otherwise available in the public domain.

A direct comparison is made, at the country level, of the number of PWID and PWID living with HIV, in order to identify those countries for which there are the largest differences between the estimates of the *World Drug Report 2017* and the study by Degenhardt and co-authors.

The methodology to determine regional and global estimates and imputing data for countries with missing information was based on the same approach in both studies and has not produced tangible discrepancies. A large part of the discrepancy in regional and global estimates is due to the differences in national data for a handful of countries.

There are important policy implications that arise from the differences in the regional estimates put forward by the two data sets. The study by Degenhardt and co-authors shows the highest prevalence of HIV among PWID living with HIV in Latin America, whereas the estimates of the *World Drug Report 2017* point to Eastern Europe as the region of greatest concern. From a global perspective, regional data on PWID and PWID living with HIV are crucial to prioritize efforts to support national institutions and non-governmental organizations to provide prevention and treatment services. Thus, defining the most recent and methodologically sound set of information is vital to ensuring that global efforts are properly targeted where they are most needed.

[a] Abu S. Abdul-Quader, Andrew L Baughman and Wolfgang Hladik, "Estimating the size of key populations: current status and future possibilities", *Current Opinion in HIV and AIDS*, vol. 9, No. 2 (2014), pp. 107–114.

[b] Louisa Degenhardt and others, "Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: a multistage systematic review", *The Lancet Global Health*, vol. 5, No. 12 (2017), pp. e1192–e1207.

[c] Bradley M. Mathers and others, "Global epidemiology of injecting drug use and HIV among people who inject drugs: a systematic review", *The Lancet*, vol. 372, No. 9651 (2008), pp. 1733–1745.

Coverage of core interventions to prevent spread of HIV and HCV among PWID remains poor and insufficient

The coverage of core interventions to help prevent the spread of HIV and HCV among PWID in most countries remains too low to be effective.[18] Core, science-based interventions for the prevention of HIV are, in order of priority: needle and syringe programmes that provide sterile injecting equipment; opioid substitution therapy to reduce dependency on opioids and hence decrease the frequency of injecting; HIV testing and counselling, which is an important gateway into treatment and care; and antiretroviral therapy to reduce the viral load and the transmission of HIV.[19] For effective HCV prevention, key interventions are needle and syringe programmes and opioid substitution therapy coupled with HCV treatment to substantially reduce the ongoing HCV transmission in the community.[20, 21] In particular, needle and syringe programmes and opioid substitution therapy can be especially effective for both HIV and HCV prevention when they are implemented together with high levels of coverage among PWID (see table 1).[22, 23, 24]

18 Sarah Larney and others, "Global, regional, and country-level coverage of interventions to prevent and manage HIV and hepatitis C among people who inject drugs: a systematic review", *The Lancet Global Health*, vol. 5, No. 12 (2017), pp. e1208–e1220.

19 *WHO, UNODC, UNAIDS Technical Guide for Countries to Set Targets for Universal Access to HIV Prevention, Treatment and Care for Injecting Drug Users: 2012 Revision* (Geneva, WHO, 2012).

20 Katy M. E. Turner and others, "The impact of needle and syringe provision and opiate substitution therapy on the incidence of hepatitis C virus in injecting drug users: pooling of UK evidence", *Addiction*, vol. 106, No. 11 (2011), pp. 1978–1988.

21 Peter Vickerman and others, "Can needle and syringe programmes and opiate substitution therapy achieve substantial reductions in hepatitis C virus prevalence? Model projections for different epidemic settings", *Addiction*, vol. 107, No. 11 (2012), pp. 1984–1995.

22 Louisa Degenhardt and others, "Prevention of HIV infection for people who inject drugs: why individual, structural and combination approaches are needed", *The Lancet*, vol. 376, No. 9737 (2010), pp. 285–301.

23 Natasha K. Martin and others, "Combination interventions to prevent HCV transmission among people who inject drugs: modeling the impact of antiviral treatment, needle and syringe programs, and opiate substitution therapy", *Clinical Infectious Diseases*, vol. 57, Suppl. No. 2 (2013), pp. S39–S45.

24 Turner and others, "The impact of needle and syringe

Availability of services for people in prison and post release

People who use drugs in prison are at greater risk of acquiring infectious diseases and have less access to relevant prevention and treatment services than those in the community outside prison.[a] The prevalence of risk behaviours, coupled with the lack of access to prevention measures in many prisons, can result in the frighteningly rapid spread of HIV. The prevalence of HIV, HCV, HBV and tuberculosis among people in prison and other closed settings is 2 to 10 times higher than among the general population.[b, c, d, e] However, access to HIV prevention, treatment and care programmes is often lacking in prison, and even where they are available, in many cases, such programmes are not necessarily of the same standard as those provided in the community.[f]

On release from prison, most people living with HIV are often discharged without support and have to face pervasive and multidimensional forms of exclusion, stigma and discrimination stemming from their incarceration history, HIV status, socioeconomic class and ethnicity.[g, h] People in prison are often not in contact with HIV, HCV and drug dependence treatment services upon release, or are provided with only some services, because often they are unaware of what services are offered.[i, j] The widespread lack of adequate discharge planning and follow-up after release has profound and immediate health effects. A systematic review found that prisoners were unlikely to be placed in contact with community health-care services upon their release from prison. People recently released from prison had poor access to HIV prevention, treatment and care as a result of stigma and discrimination, and missed out on follow-up care by health services after release due to a lack of discharge planning.[k] Research suggests that after release, use of antiretroviral therapy decreases from 51 per cent to 29 per cent, and viral suppression drops from 40 per cent to 21 per cent.[l] Lack of follow-up for HCV treatment undermines the effectiveness of prison-provided care, where it is available, and contributes to the spread of the disease in the community.[m, n]

People who use heroin are exposed to a severe risk of death from overdose after release from prison, especially in the first two weeks. Such deaths are related to a lowered tolerance to the effects of heroin developed during incarceration.[o] Yet released prisoners are rarely able to access overdose prevention medications such as naloxone and methadone, or other treatment for substance dependence.[p] Having secured housing is an important determinant of access to and retention in HIV care. Disparities in housing status contribute substantially to the gap in HIV treatment outcomes between homeless and non-homeless patients, including the attainment of viral suppression over time.[q]

[a] Ralf Jürgens, Manfred Nowak and Marcus Day, "HIV and incarceration: prisons and detention", *Journal of the International AIDS Society*, vol. 14, No. 26 (2011), pp. 1–17.

[b] Kate Dolan and others, "Global burden of HIV, viral hepatitis, and tuberculosis in prisoners and detainees", *The Lancet*, vol. 388, No. 10049 (2016), pp. 1089–1102.

[c] Kate Dolan and others, "Drug injection, sexual activity, tattooing and piercing among prison inmates: A global systematic review and meta-analysis of 2,359,220 prisoners" *Epidemiological Reviews*, (2018) (in press).

[d] Amber Arain, Geert Robaeysand Heino Stöver, "Hepatitis C in European prisons: a call for an evidence-informed response", *BMC Infectious Diseases*, vol. 14, Suppl. No. 6 (2014), pp. 1–6.

[e] Lilanganee Telisinghe and others, "HIV and tuberculosis in prisons in sub-Saharan Africa", *The Lancet*, vol. 388, No. 10050 (2016), pp. 1215–1227.

[f] Josiah D. Rich and others, "Clinical care of incarcerated people with HIV, viral hepatitis, or tuberculosis", *The Lancet*, vol. 388, No. 10049 (2016), pp. 1103–1114.

[g] Leonard S. Rubenstein and others, "HIV, prisoners, and human rights", *The Lancet*, vol. 388, No. 10050 (2016), pp. 1202–1214.

[h] Alexis C. Dennis and others, "'You're in a world of chaos': experiences accessing HIV care and adhering to medications after incarceration", *Journal of the Association of Nurses in AIDS Care*, vol. 26, No. 5 (2015), pp. 542–55.

[i] Liza Solomon and others, "Survey finds that many prisons and jails have room to improve HIV testing and coordination of postrelease treatment", *Health Affairs (Millwood)*, vol. 33, no. 3 (2014), pp. 434–442.

[j] Sung-Pil Choi and others, "Prevalence and correlates of community re-entry challenges faced by HIV-infected male prisoners in Malaysia", *International Journal of STD and AIDS*, vol. 21, No. 6 (2010), pp. 416–23.

[k] Rubenstein and others, "HIV, prisoners, and human rights".

[l] Princess A. Iroh and others, "The HIV care cascade before, during, and after incarceration: a systematic review and data synthesis", *American Journal of Public Health*, vol. 105, No. 7 (2015), pp. e5–16.

[m] Tianhua He and others, "Prevention of hepatitis C by screening and treatment in U.S. prisons", *Annals of Internal Medicine*, vol. 164, No. 2 (2016), pp. 84–92.

[n] Natasha K. Martin and others, "HCV treatment as prevention in prison: key issues", *Hepatology*, vol. 61, No. 1 (2015), pp. 402 and 403.

[o] WHO, *Preventing Overdose Deaths in the Criminal Justice System* (Copenhagen, 2014).

[p] D. Leach and P. Oliver, "Drug-related death following release from prison: a brief review of the literature with recommendations for practice", *Current Drug Abuse Reviews*, vol. 4, No. 4 (2011), pp. 292–297.

[q] Alexei Zelenev and others, "Patterns of homelessness and implications for HIV health after release from jail", *AIDS and Behaviour*, vol. 17, Suppl. No. 2 (2013), pp. 181–194.

TABLE 1 | Definition of high, moderate and low target levels for coverage of interventions

Intervention	Indicator	Level of coverage		
		low	moderate	high
Needle-syringe programmes (NSP)	Number of needle-syringes distributed per PWID per year	Less than 100	100 to less than 200	200 or more
Opioid substitution therapy (OST)	Number of OST clients per 100 PWID	Less than 20	20 to less than 40	40 or more
Antiretroviral therapy (ART)	Number of PWID receiving ART per 100 HIV-positive PWID	Less than 25	25 to less than 75	75 or more
HIV testing and counselling (HTC)	Number of PWID receiving an HIV test in the past 12 months per 100 PWID	Less than 40	40 to less than 75	75 or more

Source: WHO, UNODC, UNAIDS Technical Guide for Countries to Set Targets for Universal Access to HIV Prevention, Treatment and Care for Injecting Drug Users: 2012 Revision (Geneva, WHO, 2012).

The above-mentioned core interventions are not available in all countries where there is evidence of injecting drug use. The level of coverage of these interventions has been categorized by WHO, UNODC and UNAIDS as low, moderate, or high.[25]

A global review of the availability of these interventions assessed that the coverage of needle and syringe programmes and opioid substitution therapy among PWID was at low levels, with an estimated 33 (range: 21 to 50) needle-syringes distributed per PWID per year, and 16 (range: 10 to 24) clients of opioid substitution therapy per 100 PWID.[26] It was not possible to produce global coverage estimates for HIV testing and counselling and antiretroviral therapy because of a lack of data. In subregions with the largest numbers of PWID (East and South-East Asia, Eastern Europe and North America), there were low levels of service coverage for both needle and syringe programmes and opioid substitution therapy, with the single exception of moderate coverage of opioid substitution therapy in North America.

Of the 179 countries where there was evidence of injecting drug use (although not necessarily a PWID population size estimate), needle and syringe programmes were known to be available in 93 countries (52 per cent) and was confirmed to be absent in 83 countries (46 per cent). There was evidence of implementation of opioid substitution therapy in 86 countries (48 per cent) but it was absent in 92 countries (46 per cent). There were 79 countries (44 per cent) implementing both needle and syringe programmes and opioid substitution therapy. Information on the availability of HIV testing and counselling and antiretroviral therapy was found to be very sparse. There were 34 countries with evidence of HIV-testing programmes for PWID and 17 countries confirming an absence of such programmes. Data on antiretroviral therapy were not available in 162 countries.[27]

High levels of coverage of needle and syringe programmes and opioid substitution therapy were available in only 5 per cent and 11 per cent, respectively, of the 179 countries where there was evidence of injecting drug use. There were 79 countries (44 per cent) with implementation of both needle and syringe programmes and opioid substitution therapy; however, there were only 4 countries (3 in Western Europe and 1 in Oceania) with high coverage of both needle and syringe programmes and OST.

Deaths attributable to drug use remain high globally

Dying prematurely as a consequence of drug use is the most extreme outcome for people who use drugs. However, determining the extent of mortality attributable to drug use is not straightforward: deaths caused by drug use can be directly related to drug use disorders, such as overdose,[28] or can be indirectly

provision and opiate substitution therapy on the incidence of hepatitis C virus in injecting drug users".

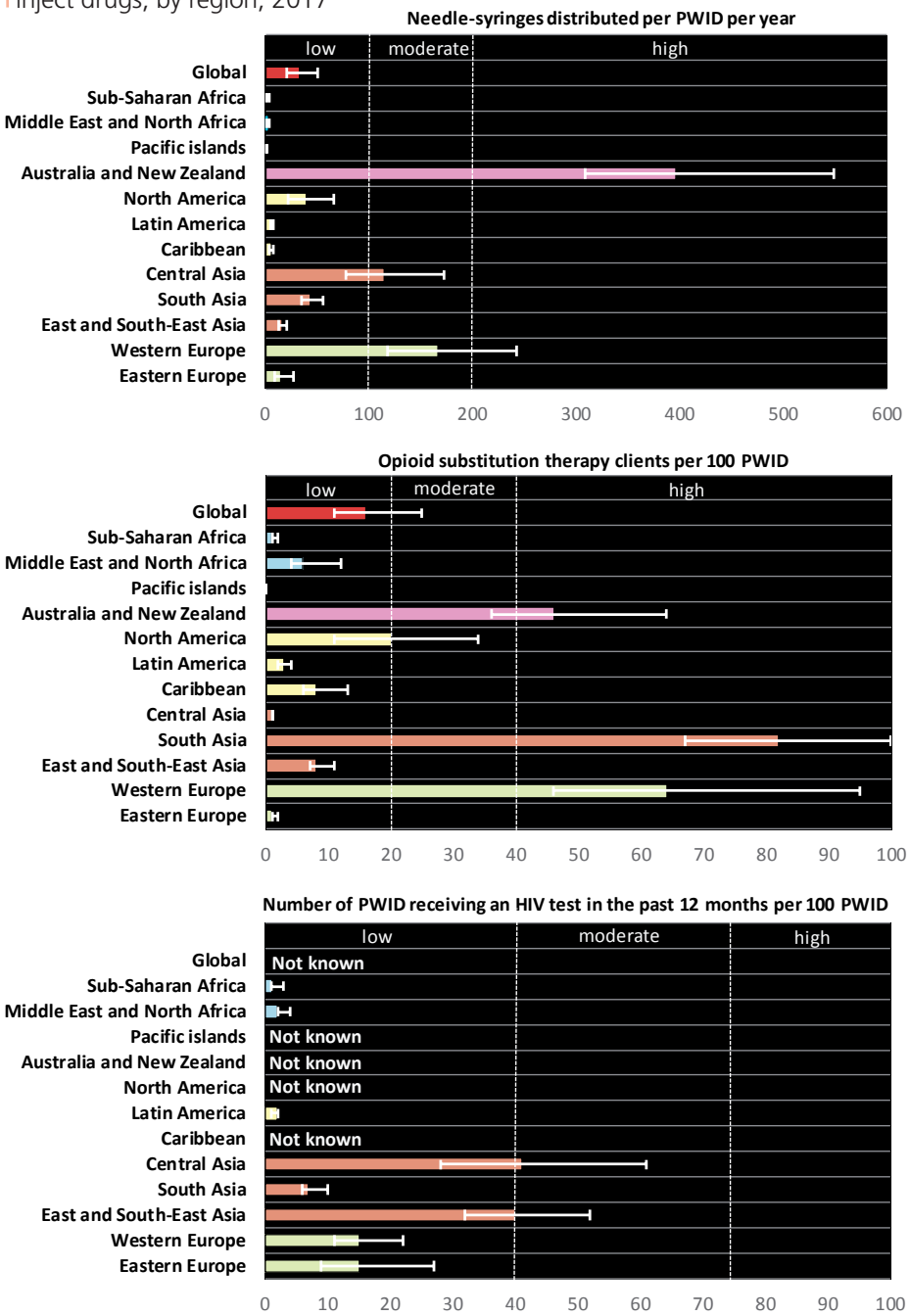
25 *WHO, UNODC, UNAIDS Technical Guide.*

26 Larney and others, "Global, regional, and country-level coverage of interventions to prevent and manage HIV and hepatitis C among people who inject drugs: a systematic review".

27 Ibid.

28 According to the International Classification of Diseases (tenth revision) of WHO, the corresponding codes are:

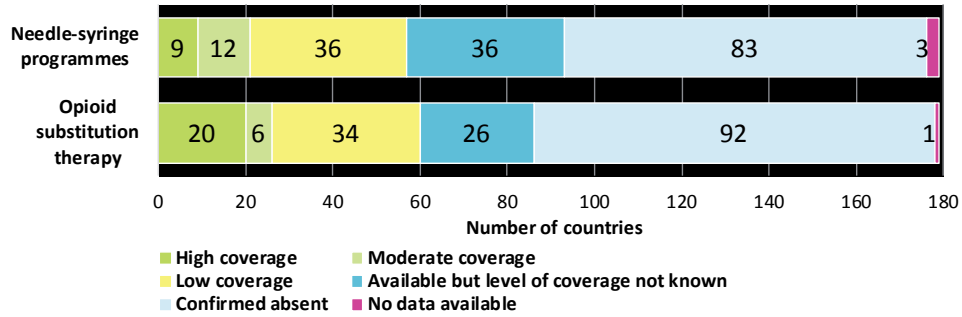
FIG. 5 Coverage of core interventions to prevent the spread of HIV and HCV among people who inject drugs, by region, 2017



Source: Sarah Larney and others, "Global, regional, and country-level coverage of interventions to prevent and manage HIV and hepatitis C among people who inject drugs: a systematic review", *The Lancet Global Health*, vol. 5, No. 12 (2017), pp. e1208–e1220.

Notes: Regional grouping are those used by the authors. The level of coverage is classified as low, moderate or high according to the WHO, UNODC, UNAIDS Technical Guide for Countries to Set Targets for Universal Access to HIV Prevention, Treatment and Care for Injecting Drug Users (2012 revision) (Geneva, WHO, 2012). In the present figure, for Australasia, information is available for only Australia and New Zealand. Regional coverage could not be determined for antiretroviral therapy because of the lack of data.

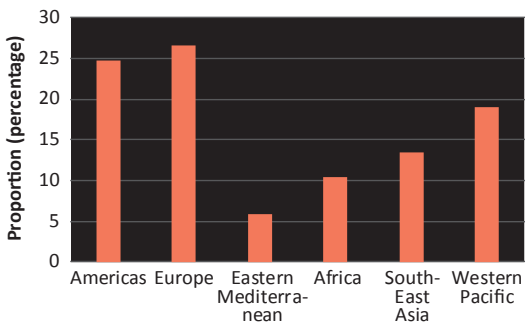
FIG. 6 Availability and coverage of needle and syringe programmes and opioid substitution therapy, by number of countries, 2017



Source: Sarah Larney and others, "Global, regional, and country-level coverage of interventions to prevent and manage HIV and HCV among people who inject drugs: a systematic review", *The Lancet Global Health,* vol. 5, No. 12 (2017), pp. e1208–e1220.

Notes: Countries included (179) are those for which there was evidence of injecting drug use, even if there was no estimate of the number of PWID. For needle and syringe programmes, the level of coverage is determined by the number of needle-syringes distributed per PWID per year, classified as follows: "low" is less than 100; "moderate" is 100–199; and "high" is 200 or more. For opioid substitution therapy, the level of coverage is determined by the number of opioid substitution therapy clients per 100 primary opioid injectors, classified as follows: "low" is less than 20; "moderate" is 20–39; and "high" is 40 or more.

FIG. 7 Regional proportions of deaths attributed to drug use disorders, 2015



Source: WHO, Global Health Estimates 2015, deaths by cause, age, sex, by country and by region, 2000–2015.

Note: Regions correspond to the classification used by WHO.

related to drug use, such as from HIV/AIDS or HCV acquired through unsafe injecting practices. The International Classification of Diseases (tenth revision) differentiates among these causes of death, but how it is applied in recording cause of death varies from country to country.

WHO estimates that there were 450,000 deaths attributable to drug use worldwide in 2015.[29] Of these, 167,750 deaths were associated with drug use disorders, that is, directly the result of drug use (with 76 per cent of deaths from drug use disorders related to the use of opioids).[30] WHO also estimates that deaths from drug use disorders had been increasing globally over the prior 15 years from an estimated 105,000 deaths in 2000. Deaths that are indirectly attributable to drug use, such as those related to HIV and HCV acquired through unsafe injecting, or from suicides, accounted for the remaining two thirds (63 per cent) of the 450,000 deaths attributable to drug use in 2015.

In previous years, the *World Drug Report* has presented global and regional estimates of deaths caused by drug use. Participants at an Expert Working Group on Improving Drug Statistics and Strengthening the annual report questionnaire, held in Vienna in January 2018, identified, given the lack of data on deaths caused by drug use in general, the need for further discussion and collaboration between UNODC and WHO in order to estimate global (direct and indirect) drug-related deaths.

Overdose deaths continue to rise in several countries with large numbers of such deaths

In 2015 and 2016, for the first time in half a century, life expectancy in the United States of America declined for two consecutive years. A key factor was

X40-44 (unintentional overdose), X61-62 (intentional self-harm (suicide)), Y10-14 (overdose of undetermined intent), T40 and T42 (poisoning by narcotic drugs).

29 WHO, *Public health dimension of the world drug problem.* Report by the Secretariat to the 70th World Health Assembly. A70/29. 27 March 2017.

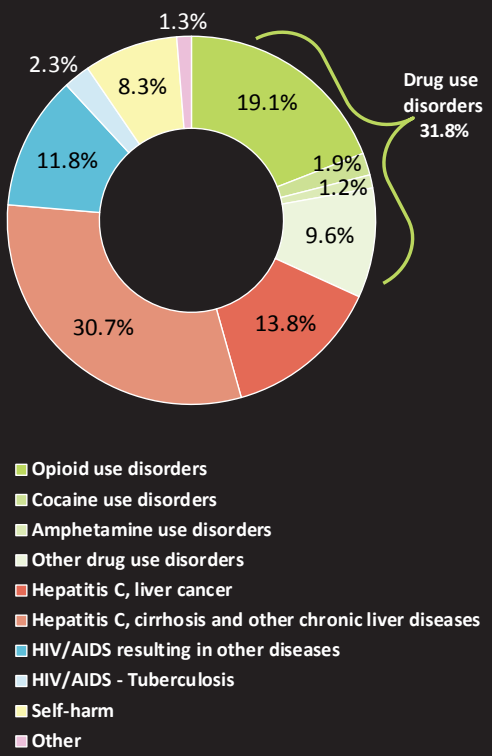
30 WHO, Global Health Estimates 2015, deaths by cause, age, sex, by country and by region.

Causes of mortality and early loss of life attributable to drug use: The Global Burden of Disease Study 2016

The Global Burden of Disease Study[a] estimated that there were 452,000 deaths (range: 420,000 to 487,000) worldwide in 2016 attributable to drug use (accounting for 0.83 per cent of global deaths from all causes). Approximately three out of four (74 per cent) of those deaths were of males. Untreated HCV, which can give rise to liver cancer and liver cirrhosis, constituted the largest proportion of them (45 per cent).

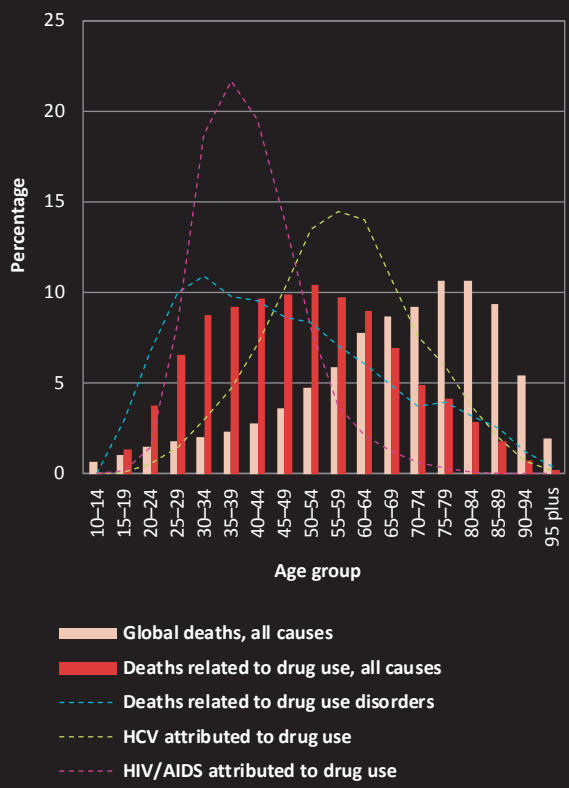
Globally, deaths attributable to drug use resulted in 16.8 million (range: 15.5 to 18.2 million) years of life lost due to premature death in 2016.[b] This suggests that a person who dies from causes attributable to drug use loses on average 37 years of life, a statistic that reflects the very young age at which many such premature deaths occur. Deaths attributed to drug use disorders (mostly overdose) peak among the youngest age group (30–34 years), while deaths from untreated HCV typically occur among an older age group (55–59 years).

(a) Leading causes of deaths attributable to drug use, 2016



Source: Emmanuela Gakidou and others, "Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016", The Lancet, vol. 390, No. 10100 (2017), pp. 1345–1422.

(b) Age distribution of deaths attributable to drug use compared to global deaths from all causes, 2016

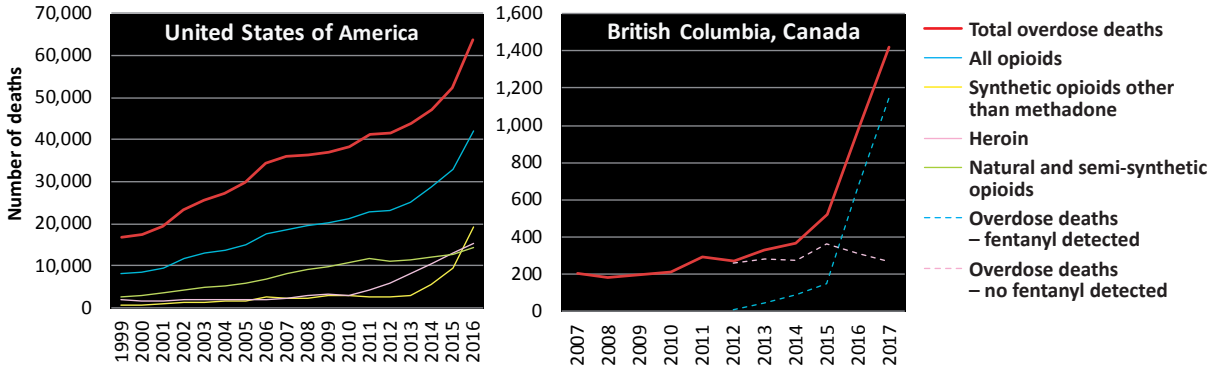


Source: Institute for Health Metrics and Evaluation, Global Burden of Disease Data.

[a] Emmanuela Gakidou and others, "Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016", *The Lancet*, vol. 390, No. 10100 (2017), pp. 1345–1422.

[b] Institute for Health Metrics and Evaluation, Global Burden of Disease Data.

FIG. 8 Overdose deaths from selected drugs in the United States and British Columbia, Canada



Source: For United States, see Holly Hedegaard, Margaret Warner and Arialdi M. Miniño, "Drug overdose deaths in the United States, 1999–2016", NCHS Data Brief, No. 294 (December 2017). For British Columbia, Canada, see British Colombia Coroners' Service, "Illicit drug overdose deaths in B.C., January 1, 2008–February 28, 2018" (Burnaby, British Columbia, Office of the Chief Coroner, 5 April 2018); and British Colombia Coroners' Service, "Fentanyl-detected illicit drug overdose deaths. January 1, 2012–December 31, 2017" (Burnaby, British Columbia, Office of the Chief Coroner, 31 January 2018).

an increase in unintentional injuries, which include drug-related deaths.[31] A study that looked at reasons for declines in life expectancy related to certain causes of mortality over the period 2000–2015 found that overdose deaths, particularly those involving the use of opioids, made an important contribution to the causes of losses in years of life expectancy.[32] Overdose deaths continued to increase in the United States, rising faster than ever, with the largest annual percentage increase ever recorded in the age-adjusted overdose mortality rate occurring from 2015 to 2016. Total overdose deaths increased by 21.4 per cent from 2015 to 2016 to reach 63,632, the highest number on record. This increase was mostly related to deaths associated with synthetic opioids other than methadone (including fentanyl, fentanyl analogues and tramadol), which increased substantially to 19,413 overdose deaths in 2016; an increase of 103 per cent (more than doubling) from 2015, which continued the sharply increasing trend that started in 2012, since when deaths associated with synthetic opioids other than methadone have increased tenfold among men and fivefold among women. In 2016, for the first time, deaths from synthetic opioids other than methadone surpassed both deaths from heroin and deaths from natural and semi-synthetic opioids (including morphine, codeine, hydrocodone and oxycodone). Overdose deaths associated with the use of heroin increased by 19 per cent from 2015 to 2016. Since 1999, deaths related to the use of heroin have increased more than twelvefold among women and sevenfold among men.[33, 34] This is in line with the 150 per cent increase in past-year heroin use among women and the 79 per cent increase in use among men that occurred from the period 2002–2004 to the period 2013–2015.[35] Excluding those deaths that also included synthetic opioids (primarily fentanyl), deaths related to the use of heroin, cocaine and methamphetamine have, however, remained essentially stable since 2013.

31 Kenneth D. Kochanek and others, Mortality in the United States, 2016. National Center for Health Statistics Data Brief No. 293, December 2017. Centers for Disease Control and Prevention.

32 Deborah Dowell and others, "Contribution of opioid-involved poisoning to the change in life expectancy in the United States, 2000-2015", *JAMA*. vol. 318, No. 11 (2017), pp. 1065–1067.

33 Holly Hedegaard, Margaret Warner and Arialdi M. Miniño, "Drug overdose deaths in the United States, 1999–2016", NCHS Data Brief, No. 294 (December 2017).

34 Centers for Disease Control and Prevention, National Center on Health Statistics, CDC WONDER. Available at https://wonder.cdc.gov/.

35 United States, Center for Behavioral Health Statistics and Quality, *Key Substance Use and Mental Health Indicators in the United States; Results from the 2015 Survey on Drug Use and Health*, HHS Publication No. SMA 16-4984, NSDUH Series H-51 (Rockville, Maryland, 2016).

Overdose deaths in British Columbia, Canada, reached a record level in 2017, continuing the sharply increasing trend that began in 2012. This increase was largely associated with fentanyl and its analogues (consumed either alone or in combination with other drugs), which had been detected in just 4 per cent of overdose deaths in 2012, whereas they were detected in 81 per cent of overdose deaths in 2017. There was a 73 per cent increase in overdose deaths in which fentanyl was detected from 2016 to 2017. The number of overdose deaths in which fentanyl was not detected, however, remained fairly stable over the period 2012–2017.[36, 37] Fentanyls remain a minor problem in other countries, with the notable exception of Estonia, where fentanyl has dominated the use of opioids for 15 years.

In Europe, overdose deaths rose for the third consecutive year to reach the highest number on record in 2015 (latest year for which data are available), with 8,441 deaths. Opioid-related deaths were responsible for the overall increase, with the presence of opioids (mostly heroin) detected in 79 per cent of overdose deaths in 2015. Increases in overdose deaths were reported in Germany, Lithuania, the Netherlands, Spain, Sweden and the United Kingdom.[38] The United Kingdom reported the highest number of overdose deaths in Europe, accounting for approximately one third (31 per cent) of the total.[39] In England and Wales,[40] the number of drug misuse deaths for both men and women that were registered in 2016 was the highest since records began in 1993: 2,593 drug misuse deaths, mostly due to heroin and/or morphine.[41]

36 Canada, British Colombia Coroners' Service, "Illicit drug overdose deaths in B.C. January 1, 2008–February 28, 2018" (Burnaby, British Columbia, Office of the Chief Coroner, 5 April 2018).

37 Canada, British Colombia Coroners' Service, "Fentanyl-detected illicit drug overdose deaths. January 1, 2012–December 31, 2017" (Burnaby, British Columbia, Office of the Chief Coroner, 31 January 2018).

38 EMCDDA, *European Drug Report 2017: Trends and Developments*, (Luxembourg, Publications Office of the European Union, 2017).

39 Ibid.

40 The definition of a drug misuse death is either a death where the underlying cause is drug abuse or drug dependence or a death where the underlying cause is drug poisoning and where any substance controlled under the United Kingdom Misuse of Drugs Act 1971 is involved.

41 United Kingdom, Office for National Statistics, "Deaths related to drug poisoning in England and Wales: 2016 registrations", Statistical Bulletin (August 2017).

In Australia, since 2011 there has been a significant increase in the rate of drug-induced deaths (deaths directly attributable to drug use), with the number reaching the highest on record in 2016 at 1,808 deaths. The majority of those deaths were caused by unintentional overdose (71 per cent), followed by suicide overdose (23 per cent), with other causes such as chronic complications of drug use or deaths of undetermined intent accounting for the remaining 6 per cent. These drug-induced deaths were mainly associated with non-medical use of benzodiazepines and oxycodone, which are both prescription drugs, used to manage anxiety and pain, respectively. Deaths from use of controlled substances have also been increasing, with the mortality rate related to stimulants (including methamphetamine and crystalline methamphetamine) quadrupling since 1999.[42]

Witnessing or personally experiencing an overdose is common

Non-fatal overdoses are substantially more common than fatal ones, with many drug users reporting that they have personally experienced a non-fatal overdose. Overdoses that are fatal make up only a very small proportion of all overdoses, an estimated 2–4 per cent.[43] Based on a global, systematic review of the literature, almost half (47 per cent; range: 17 to 68 per cent) of the drug users included in the studies[44] reported that they had experienced a non-fatal overdose at least once in their lives, with almost one in six (17 per cent; range: 4 to 38 per cent) personally experiencing a non-fatal overdose in the past year.[45]

The risk of overdose is related to the route of administration of drugs, with injecting carrying the highest

42 Australian Bureau of Statistics, "Causes of death, Australia, 2016", No. 3303.0, 27 September 2017. Available at www.abs.gov.au/ausstats/abs@.nsf/mf/3303.0.

43 Shane Darke, Richard P. Mattick and Louisa Degenhardt, "The ratio of non-fatal to fatal heroin overdose", Addiction, vol. 98, No. 8 (2003), pp. 1169–1171.

44 Among the 43 separate studies, 6 studies were among users of any substance, while the vast majority of the studies were among heroin, "crack" and/or cocaine users (21 studies), or among people who inject drugs (16 studies).

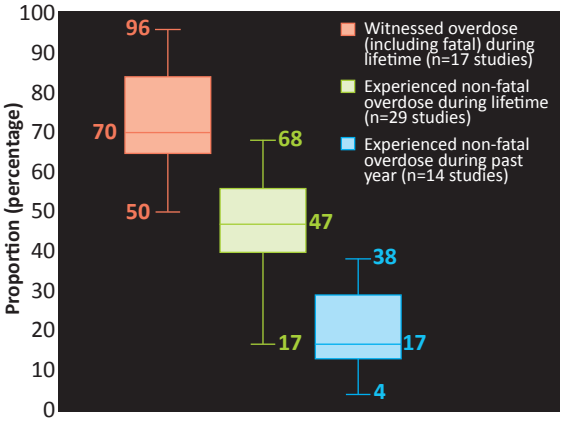
45 Silvia S. Martins and others, "Worldwide prevalence and trends in unintentional drug overdose: a systematic review of the literature", *American Journal of Public Health*, vol. 105, No. 11 (2015), pp. e29–e49.

risk of overdose compared with swallowing, sniffing or smoking.[46] Using combinations of certain drugs increases the risk of overdose, particularly the use of heroin in combination with depressants such as alcohol and benzodiazepines.[47] For people who use opioids, starting use again following a period of abstinence, such as disrupted or discontinued treatment, or soon after release from prison, leads to a heightened risk of overdose linked to a reduced tolerance to opioids.[48, 49]

Non-fatal overdoses can leave drug users with significant health problems such as muscle tissue breakdown, kidney failure, heart problems, seizures, nerve damage or cognitive impairment.[50] Experiencing a non-fatal overdose has been shown to be associated with a subsequent fatal overdose, and the risk increases with the number of prior non-fatal overdoses.[51, 52]

Early recognition that an overdose is occurring and subsequent intervention is often vital in preventing a fatal overdose. A very high proportion of people who use heroin and/or cocaine, or who inject drugs (almost three in four), report that they have witnessed an overdose (including those that prove fatal).[53] This means that people who use drugs have

FIG. 9 Proportion of drug users[a] who have witnessed an overdose (including fatal overdoses) or personally experienced a non-fatal overdose



Source: Silvia S. Martins and others, "Worldwide prevalence and trends in unintentional drug overdose: a systematic review of the literature", *American Journal of Public Health*, vol. 105, No. 11 (2015), pp. e29–e49.

Note: The numbers of studies included are shown in the legend. The shaded box depicts the middle 50 per cent of the data points (i.e., corresponding to the 25th and 75th percentiles) with the horizontal like within this box depicting the median value. The error bars are the minimum and maximum values.

[a] *Of the 43 separate studies, 6 studies were among users of any substance, while the vast majority were among heroin, "crack" and/or cocaine users (21 studies), or among PWID (16 studies).*

an opportunity to intervene and influence the outcome of the situation and whether it proves fatal, for example, by administrating naloxone in the case of an opioid overdose. So called "take-home" naloxone programmes have been implemented in a number of countries over the past 20 years, providing naloxone training and overdose management education, as well as take-home naloxone kits, to opioid users and others likely to witness opioid overdoses. Through an adequate response, including the administration of naloxone by someone witnessing the overdose, opioid overdose is reversible.[54, 55, 56, 57]

46 M. Teresa Brugal and others, "Factors associated with non-fatal heroin overdose: assessing the effect of frequency and route of heroin administration", *Addiction*, vol. 97, No. 3 (2002), pp. 319–327.

47 UNODC and WHO, "Opioid overdose: preventing and reducing opioid overdose mortality", Discussion paper, UNODC/WHO 2013 (June 2013).

48 WHO, *Preventing Overdose Deaths in the Criminal Justice System* (Copenhagen, 2014).

49 John Strang and others, "Loss of tolerance and overdose mortality after inpatient opiate detoxification: follow up study", *British Medical Journal*, vol. 326, No. 7396 (2003), pp. 959 and 960.

50 Matthew Warner-Smith and others, "Heroin overdose: causes and consequences", *Addiction*, vol. 96, No. 8 (2001), pp. 1113–1125.

51 Mark A. Stoové, Paul M. Dietze and Damien Jolley, "Overdose deaths following previous non-fatal heroin overdose: record linkage of ambulance attendance and death registry data", *Drug and Alcohol Review*, vol. 28, No. 4 (2009), pp. 347–352.

52 Alexander Caudarella and others, "Non-fatal overdose as a risk factor for subsequent fatal overdose among people who inject drugs", *Drug and Alcohol Dependence*, vol. 162 (2016), pp. 51–55.

53 Silvia S. Martins and others, "Worldwide prevalence and trends in unintentional drug overdose: a systematic review of the literature", *American Journal of Public Health*, vol. 105, No. 11 (2015), pp. e29–e49.

54 John Strang and Rebecca McDonald, eds., Preventing Opioid Overdose Deaths with Take-home Naloxone, Insights Series No. 20 (Luxembourg, EMCDDA, 2016).

55 WHO, Community Management of Opioid Overdose (Geneva, 2014).

56 EMCDDA, Preventing Fatal Overdoses: A Systematic Review of the Effectiveness of Take-home Naloxone, EMCDDA Papers (Luxembourg, Publications Office of the European Union, 2015).

57 Alexander Y. Walley and others, "Opioid overdose rates and implementation of overdose education and nasal naloxone

C. EXTENT OF DRUG SUPPLY

Drug cultivation and production

Cannabis continues to be the most widely produced illicit drug worldwide

In addition to be being the most widely consumed drug worldwide, cannabis continues to be the most widely produced. Over the period 2010–2016, the cultivation of cannabis was reported, directly or indirectly, to UNODC by 145 countries located in all regions. Accounting for 94 per cent of the global population, that is more than twice the number of countries reporting opium poppy cultivation.

Cultivation of both opium poppy and coca bush show a marked increase

Growing by some 37 per cent from the previous year, the total global area under opium poppy cultivation has doubled since 2006 to reach almost 418,000 hectares in 2017. This was primarily the result of a marked increase in opium poppy cultivation in Afghanistan,[58] which accounted for 86 per cent of global opium production in 2017. There is no single reason for the increase in opium poppy cultivation in Afghanistan as many complex and geographically diverse elements influence farmers' decisions to cultivate opium poppy. A combination of events, including political instability, corruption and a lack of government control and security may have exacerbated rule of law challenges. By shifting its focus to combatting anti-government elements in densely populated areas, the Afghan Government may have made the rural population more vulnerable. A reduction in the engagement of the international aid community may also have hindered socioeconomic development opportunities in rural areas.

Accounting for some 5 per cent of global opium production in 2017, Myanmar, by contrast, reported a decrease in opium poppy cultivation and production.

Covering an area roughly half the size of the area under opium poppy cultivation, global coca bush cultivation, which had declined by 45 per cent over the period 2000–2013, increased by 76 per cent over the period 2013–2016 to 213,000 ha.[59] Coca bush cultivation is thus back to the level reported in 2001, only slightly below (4 per cent lower) the peak in 2000. That decline and subsequent increase in coca production were primarily the consequence of changes in coca bush cultivation in Colombia; however, coca bush cultivation increased in all three coca-producing countries, Bolivia (Plurinational State of), Colombia and Peru, in 2016, resulting in a 36 per cent increase in the total area under coca bush cultivation that year.

Opium production is at its highest level since UNODC monitoring began and cocaine manufacture is at its highest ever level

With some 10,500 tons of production, estimated global opium production in 2017 is by far the highest on record since UNODC started monitoring global opium production on an annual basis at the beginning of the twenty-first century.[60] Global opium production[61] increased by 65 per cent from 2016 to 2017 (and, increased by 120 per cent since 2015), a far greater increase than the corresponding increase in the area under opium poppy cultivation. This was mainly the result of a gradual increase in poppy yields in Afghanistan, which were starting to recover from the low levels reported in the main cultivation areas over the previous few years.

Having fallen over the period 2005–2013, global cocaine manufacture[62] rose by 56 per cent over the period 2013–2016. Potential cocaine output reached 1,410 tons (at 100 per cent purity) in 2016, the highest level ever estimated, representing a 25 per

distribution in Massachusetts: interrupted time series analysis", BMJ, vol. 346 (2013), pp. 1–13.

58 For a detailed discussion on the opioid market, see booklet 3.

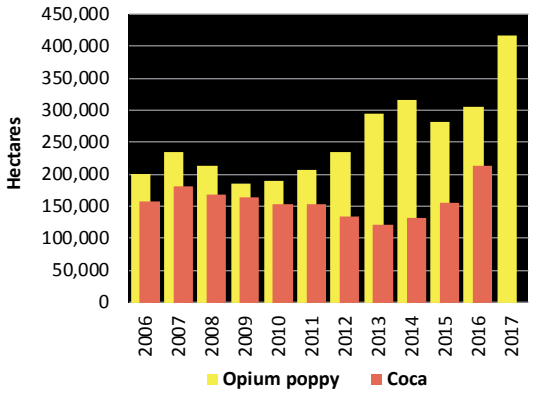
59 The latest data available on coca bush cultivation are from 2016.

60 Estimates available on opium production in the literature for the early decades of the twentieth century show far higher levels of opium production up to the mid-1930s than in the recent past (see UNODC, *A Century of International Drug Control*, 2009); however, those earlier estimates were based on different methodologies (such as payments of taxes and other levies by opium farmers) and are not fully comparable with the data presented in the present report, which are largely based on remote sensing and yield surveys (see the online methodological annex for details).

61 To estimate opium production, the area under opium poppy cultivation is multiplied by the respective opium yield per hectare in each region.

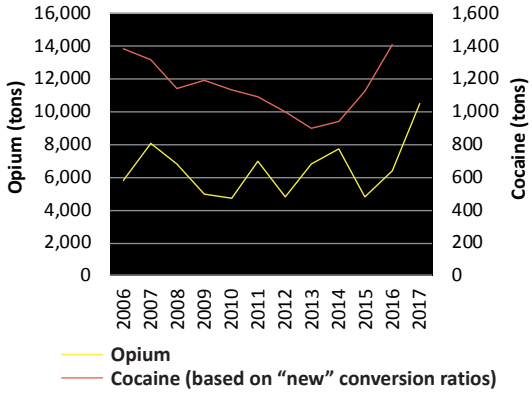
62 The Single Convention on Narcotic Drugs of 1961 refers to production of a substance, such as opium, where no further processing takes place, and the manufacture of substance, such as cocaine, where processing in laboratories is required.

FIG. 10 Total area under opium and coca cultivation, 2006–2017



Source: UNODC, coca and opium surveys in various countries; responses to the annual report questionnaire; and United States, Department of State, *International Narcotics Control Strategy Report*, various years.

FIG. 11 Global opium production and cocaine manufacture, 2006–2017



Source: UNODC coca and opium surveys in various countries; responses to the annual report questionnaire; and United States, Department of State, International Narcotics Control Strategy Report, various years.

Note: Cocaine manufacture is expressed in terms of a hypothetical manufacturing output level of 100 per cent pure cocaine; actual cocaine manufacturing output, unadjusted for purity, is significantly higher. (More information on the "new" versus the "old" conversion ratios can be found in the online methodology section of this report.)

cent rise in global cocaine manufacture from the previous year. The largest increase in potential cocaine manufacture (34 per cent) in 2016 was reported by Colombia, which accounted for more than 60 per cent of the global total.

Drug seizures

The distribution, level and pattern of drug seizures can be analysed either in terms of the quantities of a drug seized (by weight) or the number of seizure cases. Neither are a direct indicator of the trafficking of drugs as they also reflect law enforcement capacity and priorities. However, changes in the number of drug seizure cases and quantities of a drug seized, if considered together, and taking into account changes in purity-adjusted prices, can help identify trends in, and patterns of, drug supply, as well as changes in law enforcement activity and drug trafficking strategy. For example, a recent study in Australia suggested that, for most drugs (notably cocaine and ATS), increases in the frequency of seizures and the quantities intercepted primarily reflected changes in supply: those increases were shown to coincide with subsequent increases in low-level trafficking, as well as in drug-related arrests and consumption (as reflected in emergency room visits), and vice versa.[63]

Cannabis remains the drug seized in the greatest quantities worldwide, followed by coca and cocaine-related substances

Cannabis continued to account for the largest quantities of drugs seized at the global level in 2016, followed by coca and cocaine-related substances, opioids, NPS and ATS (mostly methamphetamine).

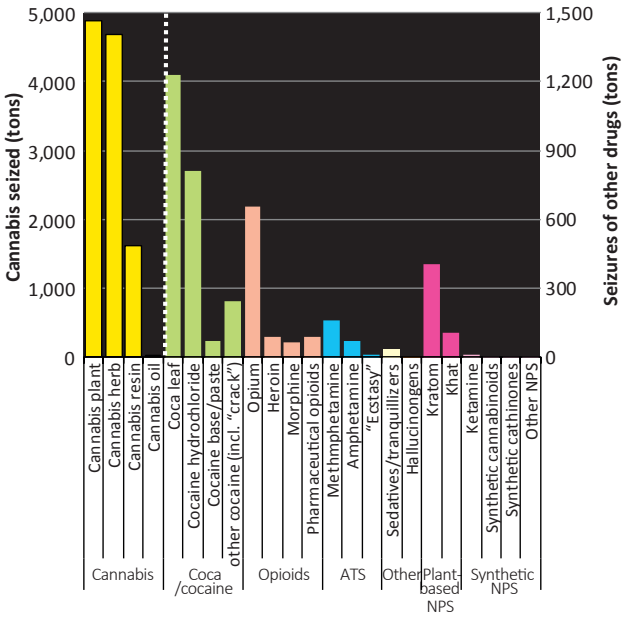
The largest quantities of opioids seized globally in 2016 were of opium. When expressed in heroin equivalent,[64] however, the largest quantities of opioids seized were of heroin, followed by pharmaceutical opioids. Seizures of the latter consisted mainly of tramadol, an opioid not under international control and, to a lesser extent, of codeine, oxycodone and fentanyl. Fentanyl and its analogues can be between 100 and 10,000 times more potent than morphine, so even small quantities can represent a very large number of doses. In terms of doses, fentanyl and its analogues are therefore estimated to account for the majority of pharmaceutical opioids seized in 2016.[65]

63 Wai-Yin Wan, Don Weatherburn, Grand Wardlaw, Vsailis Sarafidis, Grant Sara, "Do drug seizures predict drug-related emergency department presentations or arrests for drug use and possession?", International Journal of Drug Policy, 27 (2016), pp. 74–81.

64 10 kg of opium is equivalent to 1 kg of heroin.

65 See the online methodological annex for detailed calculations of the quantities seized as expressed in estimated number of doses.

FIG. 12 | Global quantities of drugs seized, 2016



Source: UNODC, responses to the annual report questionnaire data, providing information from 124 countries.

Note: Quantities seized have not been adjusted for purity or potency.

For the first time, the largest total quantity of plant-based NPS seized in 2016 was of kratom (*Mitragyna speciosa*), which has both opioid properties and stimulant-like effects; the second largest total seizure quantity of plant-based NPS was of the stimulant khat. Of the total quantity of sedatives and tranquillizers seized in 2016, the largest portion was related to methaqualone, followed by benzodiazepines, while quantities of barbiturates seized remained small. Seizures of hallucinogens in 2016 were dominated by LSD.

Marked increases in quantities of amphetamine-type stimulants, cocaine, plant-based new psychoactive substances and sedatives seized

Although cannabis continued to dominate global drug seizures, quantities of cannabis products seized decreased by 16 per cent in 2016. This reflected a 22 per cent decrease in the quantities of cannabis herb seized (driven by decreases in Africa and the Americas) to 4,700 tons and a 6 per cent increase in the quantities of cannabis resin seized to 1,600 tons.

Quantities of ATS seized worldwide increased by 20 per cent in 2016 to 247 tons, a record high. Quantities of amphetamine seized rose by 35 per cent to a record high of 70 tons in 2016, quantities of "ecstasy" seized increased by 37 per cent to 14 tons, and quantities of methampetamine seized increased by 12 per cent to a record high of 158 tons.

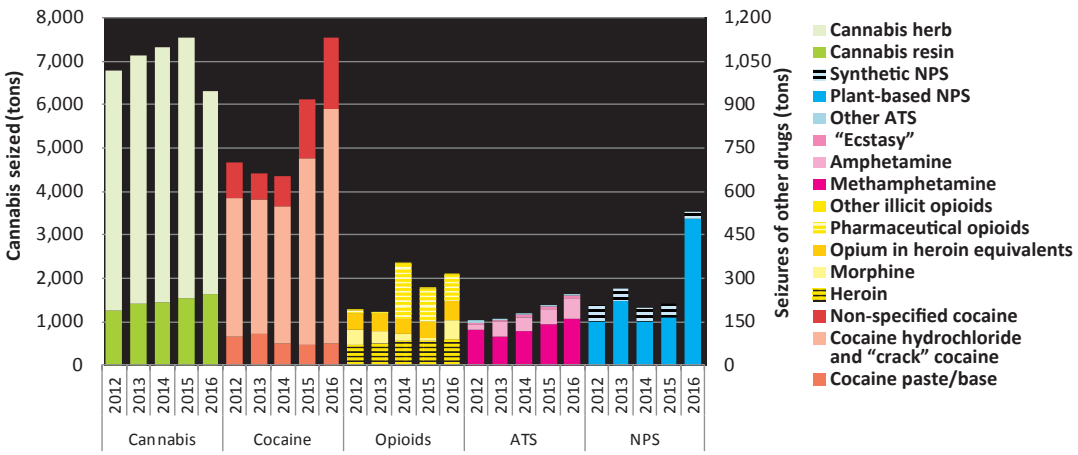
Similarly, at more than 1,100 tons,[66] the total quantity of cocaine seized worldwide (including coca paste and cocaine base) also reached an all-time high in 2016, an increase of more than 20 per cent from the previous year and of more than 60 per cent since 2012. This may be linked to the marked increases in the cultivation of coca leaf and global cocaine manufacture seen in recent years.

The sharpest increases reported in the quantities of a particular drug seized in 2016 were, however, of plant-based NPS, mainly due to seizures of kratom, which rose sevenfold to more than 400 tons. Quantities of synthetic NPS seized, by contrast, saw a marked decline of more than 50 per cent in 2016, and a decline of more than 60 per cent since 2012. The decline was most pronounced in the quantities of phenetalyamines (-99 per cent) and synthetic cannabinoids seized, which decreased by 87 per cent over the period 2012–2016; this was mostly related to a marked decline in quantities of "Spice"-type mixtures intercepted (herbal substances mixed with synthetic cannabinoids). Quantities of piperazines seized remained stable while quantities of synthetic cathinones, tryptamines and ketamine and phencyclidine-type substances seized increased over the period 2012–2016.

Quantities of opioids seized worlwide increased by some 13 per cent in 2016, mostly as a result of the increasing quantities of opiates intercepted, which reflected ongoing increases in opium production and morphine and heroin manufacture. With respective increases of 12 and 10 per cent, new record levels of both opium (658 tons) and heroin (91 tons) seizures were reported in 2016, while the total quantity of morphine intercepted rose sevenfold to 65 tons.

66 This figure is not comparable to the estimated amount of cocaine manufactured (1,410 tons), as cocaine manufactured is estimated at 100 per cent purity while cocaine seized is not adjusted for purity.

FIG. 13 | Global quantities of selected drugs seized, 2012–2016



Source: UNODC, responses to the annual report questionnaire.

Note: A rate of 10:1 was used to transform seizures of opium into seizures expressed in heroin equivalents.

Although the total quantity of pharmaceutical opioids seized worldwide in 2016 decreased by more than 20 per cent from the very high level in 2015, it was still nine times the amount seized in 2012. The increase over the period 2012–2016 was mainly driven by a large increase in the quantities of tramadol intercepted, as well as of hydrocodone, oxycodone and fentanyl.

A sevenfold increase was reported in the quantities of sedatives and tranquillizers intercepted in 2016. This was mainly the result of a marked increase in the quantities of methaqualone, benzodiazepines and GHB seized.

Quantities of hallucinogens seized worldwide decreased by more than 90 per cent from 2015 to 2016 and, over the medium term, decreased by 75 per cent from 2012 to 2016, mostly because of a marked decline in North America. However, quantities of the prototype hallucinogen LSD seized more than doubled in 2016, for the most part because of an increase in the quantities of LSD seized in Europe and North America.

The decline in the average size of drug seizures may reflect changes in both drug trafficking and law enforcement strategies

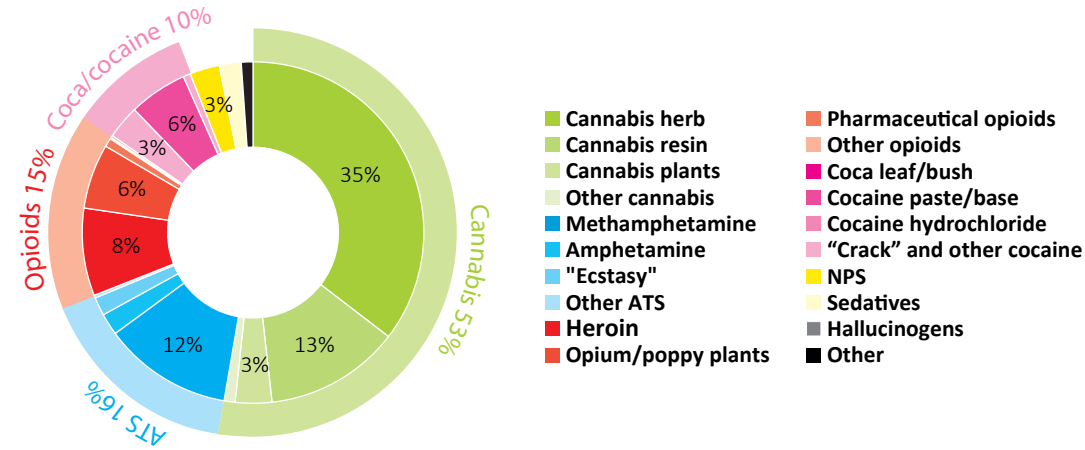
Member States reported 2.5 million drug seizure cases to UNODC in 2016, up from 2.4 million in 2015 (reported by 69 and 65 countries, respectively). More than half of all drug seizure cases in the period 2015–2016 were of cannabis (mostly herb), while the next largest number of seizure cases were of ATS.

Analysis of trends in the respective shares of each drug in seizure cases shows a decline in the share of global cannabis seizure cases over the past decade. By contrast, the share of seizure cases of ATS (mostly methamphetamine), opioids and NPS rose over the same period. Such trends are confirmed when analysing data from 71 countries that reported seizure cases in the two periods, 2005–2006 and 2015–2016.

It is challenging to compare global trends in the number of drug seizure cases and quantities seized because not all countries always report the number of seizure cases intercepted. Considering the sample of countries that reported the number of seizures and quantities seized in both 2005–2006 and 2015–2016 (71 countries), it can be noted that overall the number of drug seizure cases increased by 17 per cent from the period 2005–2006 to the period 2015–2016, while the quantities of drugs seized increased by 3 per cent.

The average size of drug seizure cases decreased from roughly 6 kg in 2005–2006 to 5 kg in the period 2015–2016. However, that overall decline in the average seizure size in the 71 reporting countries masks the variations between the different types of drug intercepted. The average size of seizure cases of cannabis herb, cannabis resin, cocaine, morphine, "ecstasy", plant-based NPS and synthetic NPS

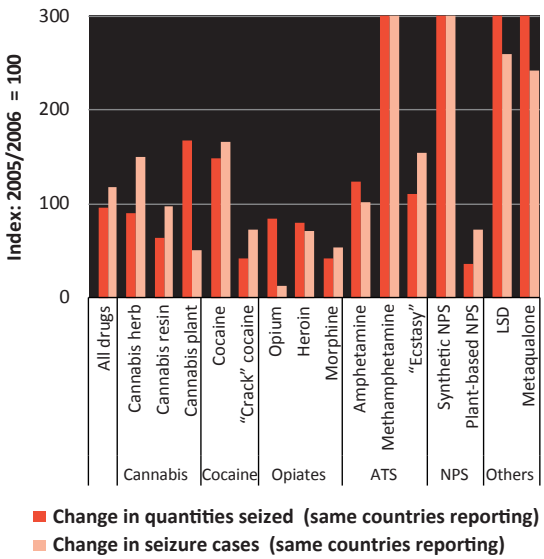
FIG. 14 | Distribution of global number of drug seizure cases, 2015–2016



Source: UNODC, responses to the annual report questionnaire.

Note: The calculations are based on a breakdown of almost 5 million seizure cases reported to UNODC in the period 2015–2016 period. The data set includes 2.4 million seizures cases reported in 2015 and 2.5 million seizures cases in 2016. Seizure case information is based on information from 80 countries, including 65 countries reporting in 2015 and 69 countries reporting in 2016.

FIG. 15 | Changes in quantities of drugs seized and number of drug seizure cases from 2005–06 to 2015–16



Source: UNODC, responses to the annual report questionnaire

Note: Calculation based on data from 71 countries (index: 2005–2006 = 100).

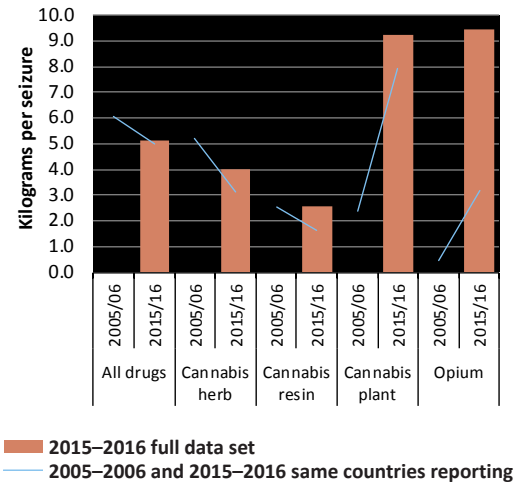
decreased from the period 2005–2006 to the period 2015–2016, while the average size of individual seizure cases of cannabis plant, opium, methamphetamine, amphetamine, LSD and methaqualone increased.

The stronger increase in the number of drug seizure cases as compared to the quantities of drugs seized and thus the decline in the average size of seizure cases from the period 2005–2006 to the period 2015–2016 might stem from changes in both law enforcement and drug trafficking practices. Changes in law enforcement strategies may include the targeting of retail and microtrafficking and a greater emphasis on less bulky types of drugs. Changes in drug trafficking activities may include a trend towards an increasing number of shipments of smaller quantities of a drug — a strategy used by drug trafficking organizations to reduce losses resulting from seizures (including the use of drug mules and postal/private parcel services, particularly in the case of drugs sold on the darknet). A trend of trafficking less bulky drugs or trafficking substances of a higher purity might also be responsible for declining amounts seized per seizure cases, as might be an increase in the use of social supply networks for distributing drugs. Improved reporting of smaller seizure cases might also have contributed to the decline in the average size of individual seizures.

However, differences in the average weight of seizure cases for different drug types are not necessarily an indication of changes in law enforcement interventions or the modus operandi of drug traffickers, as there are large differences in purity and potency for the various substances.

Seizures of some of the bulkiest drugs, such as plant-based NPS (13 kg per case, and mainly reflecting seizures of khat and kratom), opium (9.5 kg) and cannabis plant (9.2 kg), accounted for the largest average size of seizure cases over the period 2015–2016.

FIG. 16 Average size of drug seizures in 2015–2016 and trend in average size from the period 2005–2006 to the period 2015–2016, selected drugs



Source: UNODC, responses to the annual report questionnaire.
Note: See online methodological annex for calculation details.

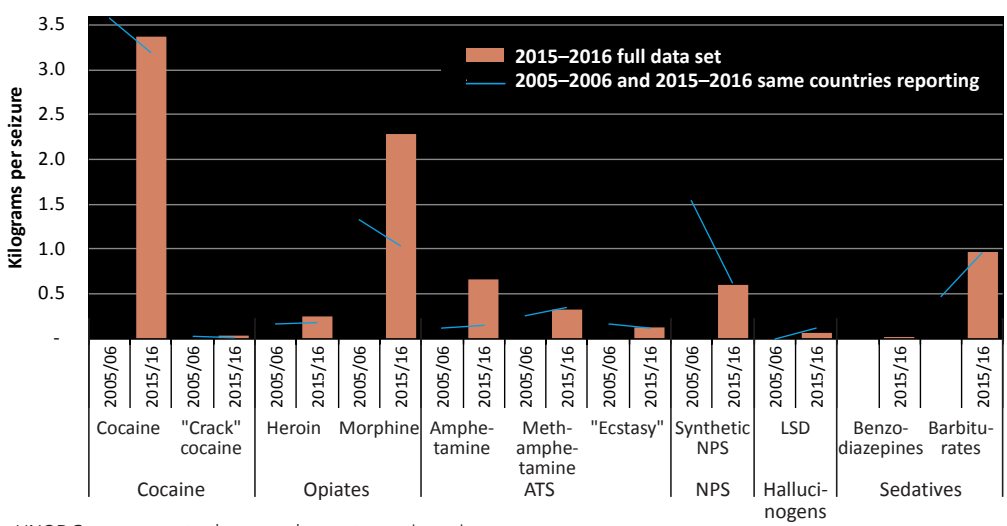
The average size of seizures of cocaine (3.4 kg per case) intercepted in the period 2015–2016 was far larger than, for example, the average size of individual seizures of ATS, synthetic NPS or heroin, which may suggest that cocaine is more likely than other drugs to be trafficked in large quantities, for instance, on semi-submersibles and ships and in containers. Despite being trafficked on similarly long and diverse trafficking routes to its main consumer markets, seizure cases of heroin (0.2 kg) were, on average, substantially smaller in terms of weight than those of cocaine.

The smallest average seizures (under 10 g) reported in the period 2015–2016 were of LSD, benzodiazepines, "crack" cocaine and barbiturates. This may be a reflection of the relatively short distances between manufacturing locations (LSD, "crack" cocaine), or between the point where they are diverted into illicit channels (benzodiazepines and barbiturates), and their respective consumer markets.

Drug trafficking via the darknet is a growing challenge for authorities

Empirical research on the darknet (the part of the "deep web" containing information that is only accessible using special web browsers) is limited so far. Summarized below, some recent studies

FIG. 17 Average size of drug seizures in 2015–2016 and trend in average size from the period 2005–2006 to the period 2015–2016, selected drugs



Source: UNODC, responses to the annual report questionnaire.
Note: See online methodological annex for calculation details.

(typically making use of web-crawling techniques whereby repeated snapshots of various darknet market sites are made and analysed) help provide a better understanding of trends and patterns linked to drug purchases via the darknet. The discussion also draws on the experience and in-depth knowledge of European and North American police specialists involved in undercover activities to identify drug sellers and dismantle darknet drug selling platforms.

Darknet: drug market business model

The darknet is being used for many illicit activities, including drug trafficking. A darknet study conducted jointly by EMCDDA and Europol found that more than 60 per cent of all listings on five major darknet markets worldwide up to August 2017 were related to the illicit sale of drugs, including drug-related chemicals and pharmaceuticals.[67] The illicit sale of drugs alone accounted for almost half of all such listings.

People wishing to purchase drugs via the darknet typically access it through the "Onion router" (TOR) to ensure that their true identities remain concealed. The use of specialized darknet explorers, such as Grams, enables them to navigate to their desired market platform where products bought on darknet marketplaces are typically paid for in cryptocurrencies such as bitcoin.[68] Bitcoins can then be used to purchase other goods and services or can be exchanged for different national currencies. The delivery of drugs purchased on those marketplaces is usually undertaken by public or private postal services,[69] with parcels often sent to anonymous post office boxes, particularly to automated "pack stations", for self-service collection.

The main advantage for both suppliers and customers is the anonymity of the transaction as it does not require any physical contact. Darknet trafficking also overcomes the challenge of suppliers and customers having to be in the same location, as well as the need for suppliers to have the critical mass necessary to sustain a standard drug market. As with orthodox Internet transactions, customers also benefit from other customers' feedback on the quality of products sold and the reliability of the supplier. Darknet platforms also guarantee the payment of the goods sold, typically making use of escrow account systems,[70] which request immediate payment for goods ordered while delaying the finalization of payment until goods ordered have actually been received by the customer.

High degree of volatility and frequent disappearance of darknet drug trading platforms

Darknet markets have been in operation since 2010,[71] although they have only gained true importance since the start of the Silk Road trading platform in February 2011 (closed down in October 2013). They consist of websites that are used as trading platforms, similar to licit trading platforms on the public World Wide Web (the "Surface Web") used for purchasing licit goods and services. The illegality of many darknet transactions means, however, that there are significant differences between darknet and open World Wide Web trading platforms.

Principal among those differences are the use of a dedicated currency, mostly bitcoin, escrow accounts and the rapid emergence and disappearance of trading platforms, often directly linked to illegal business practices. Based on a detailed analysis by EMCDDA and Europol of 103 darknet marketplaces operating globally over the period 2011–2017, darknet markets remain active for just over eight months on average, with the most enduring ones operating, on average, for just under four years, and most not lasting more than a year. The main platforms on the darknet have thus changed frequently, from Silk Road over the period 2011–2013, to Agora and

67 EMCDDA and Europol, *Drugs and the Darknet: Perspectives for Enforcement*, Research and Policy, Joint publications series (Luxembourg, Publications Office of the European Union, 2017), p. 15.

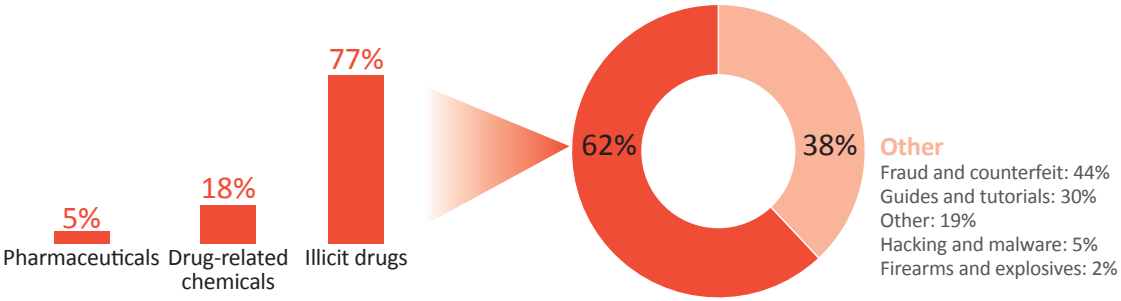
68 Since the beginning of the darknet drug markets, the bitcoin has been the most popular payment currency (Martin Horton-Eddison and Matteo Di Cristofaro, "Hard interventions and innovation in crypto-drug markets: the escrow example", Policy Brief No. 11 (Swansea, United Kingdom, Global Drug Policy Observatory, Swansea University, August 2017)), p. 4.

69 World Customs Organization, *Illicit Trade Report 2015* (Brussels, December 2016), p. 44.

70 Horton–Eddison and Di Cristofaro, "Hard interventions and innovation in crypto-drug markets", p. 3.

71 EMCDDA and Europol, *Drugs and the Darknet.*

FIG. 18 Importance of drugs and drug-related chemicals for the darknet (based on listings on the main darknet markets)



Source: EMCDDA and Europol, Drugs and the darknet, November 2017, p. 15.

Note: Based on active listings data from AlphaBay, Dream Market, Hansa, TradeRoute and Valhalla darknet marketplaces, spanning from the launch of each marketplace to 21 August 2017 (or market closure).

Evolution in 2014, AlphaBay, Nucleus and Dream Market in 2015–2016, and predominantly AlphaBay in 2017. Since the dismantlement of AlphaBay in July 2017, the main platforms have been Dream Market and emerging markets such as Valhalla, Silk Road 3.1, Darknet Heroes League, Apple Market, House of Lions Market, TradeRoute, Wall Street Market, RSClub Market, Zion Market, Infinite Market, CGMC and OW Market.[72]

EMCDDA and Europol also analysed the reasons for the closure of 89 marketplaces operating globally over the period extending from 2010 to the end of July 2017. They found that "exit scams", in which operators suddenly closed down their sites and pocketed all money held in escrow accounts which had been used to facilitate transactions, were the most common reason for closure (35 per cent), followed by "voluntary exits" (27 per cent), closures prompted by law enforcement action (17 per cent) and hacking by third parties (12 per cent).[73]

Even though law enforcement agencies were not responsible for the bulk of closures of trading platforms, in terms of the number of sites operating on the darknet over the period 2011–2017, authorities had one of their biggest successes in July 2017 with the take-down of the then largest drug trading platform, AlphaBay, as part of Operation Bayonet, jointly conducted by the United States, Canada, Thailand, The Netherlands, Europol and various other European police forces.[74] In early 2016, with 38,000 listings, AlphaBay accounted for almost 30 per cent of all listings identified on darknet sites at that time.[75] A year later, there were more than 250,000 listings for illegal drugs and chemicals on AlphaBay, as well as over 100,000 listings for stolen and fraudulent identification documents and access devices, counterfeit goods, malware and other computer hacking tools, firearms and fraudulent services. AlphaBay reached over 200,000 users and 40,000 vendors during its existence.[76] The site's daily sales in early 2017 amounted to more than 600,000 euros, up from some 200,000 euros per day a year earlier and about twice as much as the record sales figure of Silk Road at its peak in summer 2013, a few months before the site was shut down by authorities.[77] The authorities also succeeded in taking down the trading platform Hansa, the then "third largest criminal marketplace on the dark web, trading similarly high volumes in illicit drugs and other commodities".[78]

In the past, the take-down of major trading platforms did not have a major impact on drug trafficking via the darknet over a prolonged period

72 Ibid.

73 Ibid.

74 Europol, "Massive blow to criminal dark web activities after globally coordinated operation", Press release, 20 July 2017.

75 Kristy Kruithof and others, "Internet facilitated drugs trade: an analysis of the size, scope and the role of the Netherlands", Research Report Series, document No. RR-1607-WODC (Santa Monica, California, Rand Corporation, 2016). Available at www.rand.org/.

76 Europol, "Massive blow to criminal dark web activities…".

77 EMCDDA and Europol, *Drugs and the Darknet*, p. 42.

78 Europol, "Massive blow to criminal dark web activities…".

of time. EMCDDA and Europol suggest that "law enforcement interventions in the form of darknet market take-downs disrupt darknet markets, although the overall ecosystem appears to be fairly resilient with new markets quickly becoming established".[79] Examples have shown that both vendors and customers simply migrate to the next largest trading platform and continue their operations.[80] The listings of major darknet drug markets, analysed by Europol, revealed an immediate decline in overall darknet activities following the shutdown of major darknet drug markets, and thus an increase in prices on the surviving marketplaces in the immediate aftermath of the takedown. However, prices soon returned to their pre-takedown levels as vendors and customers migrated to alternative darknet markets.[81]

Monitoring the volume of darknet transactions will show whether the take-down of the AlphaBay and Hansa platforms in July 2017 have a long-term impact. Indeed, before taking down the Hansa site, the police continued operating the site for a couple of days to gain insights into its operations and to obtain additional data on clients and vendors.

The value of the bitcoin is not affected by shutdowns of darknet markets. Speculative investment in the bitcoin market has been of far greater importance to the value of the bitcoin than have darknet market take-downs. Bitcoins remain the principal means of exchange in darknet market transactions, but the volume of bitcoins used for illicit drug transactions still appears to account for a limited portion of all bitcoins transactions. One recent study of bitcoin laundering, using a new forensic analysis tool that combines public blockchain data with a proprietary data set of bitcoin addresses, suggested that "illicit bitcoins", which were mostly linked to transactions on darknet markets (mainly to Silk Road in 2013, Agora in 2014 and 2015, and AlphaBay in 2016) accounted for just 0.6 per cent of all incoming transactions exchanged into different national currencies over the period 2013–2016. The study's authors conceded, however, that this was probably a lower-bound estimate and that the true percentage of bitcoin laundering may be higher.[82]

The overall importance of drug trafficking via the darknet remains very limited

EMCDDA and Europol estimated drug sales made on 16 major darknet markets over the period from 22 November 2011 to 16 February 2015 to have amounted to 172.4 million euros worldwide (79 million euros generated in European Union countries and 93.3 million euros in other countries),[83] equivalent to some $222 million, or an average of $44 million per year. The largest revenues in Europe were generated by the sale of ATS (amphetamine and "ecstasy"), followed by sales of cannabis and cocaine, with the drug vendors accounting for the largest revenues being those in Germany (more than 25 million euros), the United Kingdom (20 million euros) and the Netherlands (18 million euros).[84]

A subsequent analysis of drug trafficking via AlphaBay[85] revealed that the former site actually generated far larger drug sales over the period 2015–2017 than over the previous four-year period. Sales in the period 2015–2017 were estimated to be 163 million euros, consisting of 46.4 million euros in European Union countries and 116.6 million euros in the rest of the world, in the period from January 2015 to July 2017 (equivalent to 65 million euros or $73 million per year on average). It is unclear, however, if the increase in the volume of transactions via AlphaBay over the period 2015–2017 was the result of a sharp increase in overall drug trade on the darknet or an increase in the popularity of the site at the expense of other sites.

Another study, conducted by RAND Europe in 2016, estimated that monthly drug-related revenues

79 EMCDDA and Europol, *Drugs and the Darknet*, p. 11.

80 Based on the findings of an international conference on joint investigations to combat drug trafficking via the virtual market (darknet) in the European Union, held in Bad Erlach, Austria, from 18 to 20 November 2015.

81 EMCDDA and Europol, *Drugs and the darknet*, p. 62.

82 Yaya J. Fanusie and Tom Robinson, "Bitcoin laundering: an analysis of illicit flows into digital currency services", 12 January 2018. Available at www.defenddemocracy.org/.

83 EMCDDA and Europol, *Drugs and the Darknet*, p. 35.

84 EMCDDA and Europol, *Drugs and the Darknet*, p. 47.

85 Based on the application of DATACRYPTO, a web crawler, RAND Europe identified 37,896 listings on AlphaBay on 22 December 2014; the total number of listings identified on 19 cryptomarkets (mostly investigated a few months later, in 2015) reached a total of 133,061 listings; see web article "Internet-facilitated drugs trade", available at www.rand.org.

generated by the then eight largest darknet markets[86] amounted to a total of $14 million to $25 million per month in early 2016 (equivalent to $170 million to $300 million per year). A much higher figure than the EMCDDA/Europol estimate for the period 2011–2015 ($44 million per year), this could suggest a marked expansion in darknet market activities in recent years. Nevertheless, according to the estimates provided in the RAND Europe study, the global darknet drug market accounts for no more than 0.1–0.2 per cent of the combined annual drug retail markets of the United States[87] and the European Union.[88] Caution needs to be applied, however, as the methodology used in the RAND Europe study assumed that all buyers purchased only the amounts specifically mentioned in offers on the darknet, which may underestimate overall quantities purchased per transaction and, thus, underestimate the overall estimated revenue.

The RAND Europe study also estimated that the largest drug-related revenues on the darknet in 2016 were generated by vendors operating in North America (43 per cent of global revenues), most notably those operating out of the United States (36 per cent of global revenues) and, to a lesser extent, Canada (7 per cent). This was followed by vendors operating out of Europe (more than 35 per cent of global revenues), most notably those operating out of the United Kingdom (16 per cent of global revenues), Germany (8 per cent) and the Netherlands (8 per cent).[89] Those three countries were also identified by the EMCDDA/Europol study as the European countries most affected by darknet trafficking.[90] Other main vendors were found in Australia (11 per cent of global revenues), while a further 3 per cent of revenues were generated in other countries. Analysis of the number of vendors found by email addresses next to drug listings on various darknet market sites (available from a fifth of all vendors) also identified a number of vendors in Asia, most notably in China (9 per cent of all such identified email listings) and India (3 per cent), as well as Afghanistan (1 per cent).[91]

Studies suggest marked growth in drug-related darknet activities in recent years

Information provided by law enforcement[92] and research on drug supply and demand suggest that drug-related activities on the darknet have increased in recent years.[93] The RAND Europe study found that monthly transactions rose 2.6-fold over the period from October 2013 to January 2017,[94] and the EMCCDA darknet study showed that monthly darknet sales via AlphaBay tripled between early 2016 and early 2017.[95] To date, no information is available on the evolution of darknet sales subsequent to the dismantling of AlphaBay and Hansa in July 2017.

The Global Drug Survey, based on a non-representative convenience sample (which cannot be extrapolated to drug users outside the survey) of around 100,000 self-selected people in over 50 countries (more developed countries than developing countries) who responded to an online survey, found that the proportion of Internet users using drugs who purchased their drugs via the darknet rose from 4.7 per cent in 2014 to 9.3 per cent in January 2018, with increases reported in practically all countries. The highest proportions of Internet users using drugs reporting the purchase of drugs via the darknet in 2018 were found in North America, Oceania and Europe.

One survey question regarding the consequences of the shutdown of AlphbaBay and Hansa revealed that 15 per cent of Internet users who use the darknet for purchasing drugs had used darknet markets

86 These markets were, in January–February 2016, AlphaBay, Nucleus, Dreammarket, Cryptomarket, Hansa, Python, French Dark Net, Dark Net Heroes League, then accounting for some 80 per cent of all listings.

87 The United States drug market was estimated by the Office of National Drug Control Policy at around $109 billion in 2010 (range: $69–$171 billion) (Beau Kilmer and others, *What America's Users Spend on Illegal Drugs: 2000–2010*, Research Report Series, document No. RR-534-ONDCP (Santa Monica, California, Rand Corporation, 2014)).

88 EMCDDA estimated the European retail value of the illicit drug market was around 24.3 billion euros (range: 21 billion–31 billion euros) in 2013, equivalent to some $32 billion per year.

89 Rand Europe, "Internet-facilitated drugs trade".

90 EMCDDA and Europol, *Drugs and the Darknet*, p. 47.

91 Rand Europe, "Internet-facilitated drugs trade".

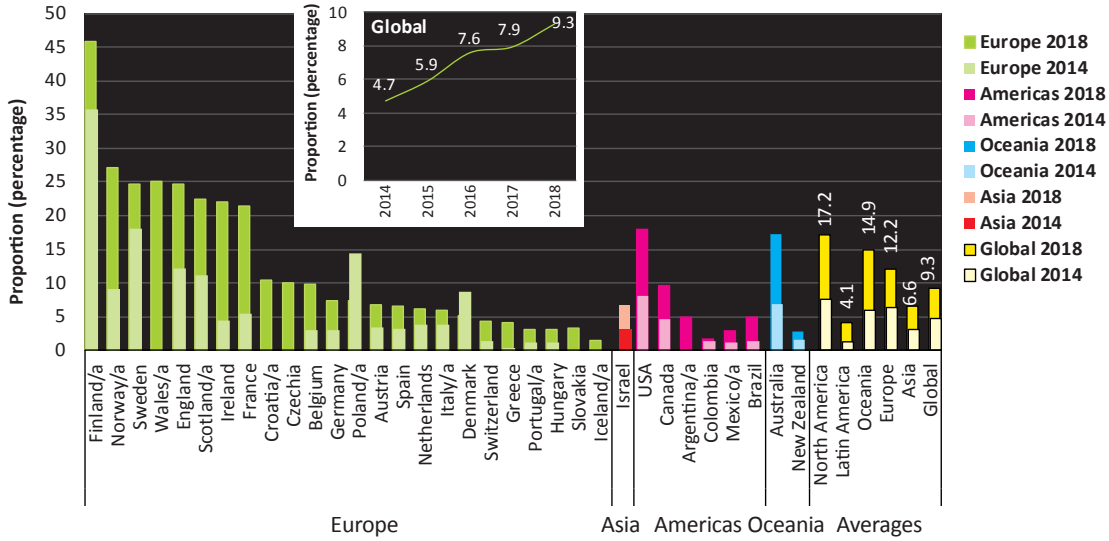
92 Europol, SOCTA 2017: *European Union and Organised Crime Threat Assessment – Crime in the Age of Technology* (The Hague, 2017), p. 11.

93 EMCDDA and Europol, *Drugs and the Darknet*, p. 10.

94 RAND Europe, "Internet-facilitated drugs trade".

95 EMCDDA and Europol, *Drugs and the Darknet*, p. 43.

FIG. 19 | Proportion of Internet users reporting to an online survey who used drugs in the past year and who purchased drugs via the darknet, 2014 and 2018 (annual prevalence)



Source: Global Drug Survey. Available at https://www.globaldrugsurvey.com/wp-content/themes/globaldrugsurvey/results/GDS2017_key-findings-report_final.pdf.

Note: The proportions shown here are based on convenience samples of people who volunteered to participate in these surveys. The total number of persons answering darknet market-related questions was 53,5572 in 2018, all of whom also reported their past-year drug use.

[a] *For the following countries no data for 2014 or 2018 were available, so data from the closest year were used instead: Finland (2016 and 2018); Norway (2016 and 2017); Wales (2017); Scotland (2015 and 2018); Croatia (2017); Greece (2017); Poland (2015 and 2018); Italy (2015 and 2018); Portugal (2014 and 2017); Iceland (2017); Argentina (2017); Mexico (2014 and 2017).*

less frequently thereafter while 9 per cent had completely stopped using the darknet for drug purchases while 19 per cent applied operational security changes to increase their security when using the darknet markets. Most (57 per cent), however, did not consider themselves affected by the closure of the darknet markets.

Annual prevalence of the use of cannabis, opioids and opiates, by region and globally, 2016

Region or subregion	Cannabis						Opioids (opiates and prescription opioids)						Opiates					
	Number (thousands)			Prevalence (percentage)			Number (thousands)			Prevalence (percentage)			Number (thousands)			Prevalence (percentage)		
	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper
Africa	**51,930**	**37,110**	**75,930**	**7.6**	**5.5**	**11.2**	**2,190**	**970**	**3,700**	**0.32**	**0.14**	**0.54**	**2,060**	**970**	**3,150**	**0.30**	**0.14**	**0.46**
East Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Southern Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West and Central Africa	34,260	28,520	42,420	13.2	11.0	16.3	-	-	-	-	-	-	-	-	-	-	-	-
Americas	**52,900**	**51,600**	**55,080**	**8.0**	**7.8**	**8.3**	**14,330**	**12,660**	**17,100**	**2.16**	**1.90**	**2.57**	**2,840**	**2,070**	**3,650**	**0.43**	**0.31**	**0.55**
Caribbean	630	230	1,730	2.2	0.8	6.1	-	-	-	-	-	-	-	-	-	-	-	-
Central America	820	410	1,320	2.8	1.4	4.4	-	-	-	-	-	-	-	-	-	-	-	-
North America	41,510	41,330	41,680	12.9	12.9	13.0	13,570	12,330	14,520	4.22	3.84	4.52	2,560	1,890	3,150	0.80	0.59	0.98
South America	9,940	9,630	10,340	3.5	3.4	3.6	580	250	2,160	0.20	0.09	0.76	240	150	330	0.08	0.05	0.12
Asia	**56,610**	**47,750**	**71,180**	**1.9**	**1.6**	**2.4**	**13,590**	**9,390**	**19,340**	**0.46**	**0.32**	**0.65**	**11,230**	**7,740**	**15,650**	**0.38**	**0.26**	**0.53**
Central Asia	1,480	440	2,440	2.6	0.8	4.2	540	480	590	0.93	0.83	1.03	520	460	580	0.90	0.80	1.00
East and South-East Asia	9,650	4,460	21,490	0.6	0.3	1.3	3,280	2,320	4,010	0.20	0.14	0.25	3,280	2,320	4,010	0.20	0.14	0.25
Near and Middle East/South-West Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Europe	**27,860**	**27,180**	**28,610**	**5.1**	**5.0**	**5.2**	**3,570**	**3,430**	**3,790**	**0.65**	**0.63**	**0.69**	**3,200**	**2,990**	**3,620**	**0.59**	**0.55**	**0.66**
Eastern and South-Eastern Europe	5,490	5,120	5,830	2.4	2.3	2.6	1,750	1,670	1,840	0.78	0.74	0.81	1,500	1,430	1,590	0.67	0.63	0.70
Western and Central Europe	22,370	22,060	22,780	7.0	6.9	7.1	1,820	1,760	1,950	0.57	0.55	0.61	1,700	1,560	2,040	0.53	0.49	0.64
Oceania	**2,850**	**2,130**	**3,250**	**11.0**	**8.3**	**12.6**	**580**	**550**	**610**	**2.24**	**2.13**	**2.37**	**40**	**40**	**70**	**0.16**	**0.14**	**0.28**
Australia and New Zealand	2,070	2,070	2,070	11.0	11.0	11.0	560	550	570	2.95	2.90	2.99	35	35	41	0.18	0.18	0.22
Melanesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micronesia	60	40	80	16.6	10.7	22.7	-	-	-	-	-	-	-	-	-	-	-	-
Polynesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLOBAL ESTIMATE	**192,150**	**165,760**	**234,060**	**3.9**	**3.4**	**4.8**	**34,260**	**27,010**	**44,540**	**0.70**	**0.55**	**0.91**	**19,380**	**13,800**	**26,150**	**0.40**	**0.28**	**0.53**

Source: UNODC estimates based on annual report questionnaire data and other official sources.

Annual prevalence of the use of cocaine,[a] amphetamines[b] and "ecstasy", by region and globally, 2016

Region or subregion	Cocaine						Amphetamines and prescription stimulants						"Ecstasy"					
	Number (thousands)			Prevalence (percentage)			Number (thousands)			Prevalence (percentage)			Number (thousands)			Prevalence (percentage)		
	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper	Best estimate	Lower	Upper
Africa	**3,180**	**920**	**5,720**	**0.47**	**0.13**	**0.84**	**5,980**	**1,910**	**10,420**	**0.88**	**0.28**	**1.53**	**1,410**	**450**	**2,420**	**0.21**	**0.07**	**0.36**
East Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Southern Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
West and Central Africa	1,805	725	2,890	0.69	0.28	1.11	-	-	-	-	-	-	-	-	-	-	-	-
Americas	**9,230**	**8,510**	**9,880**	**1.39**	**1.28**	**1.49**	**7,530**	**6,210**	**8,790**	**1.13**	**0.93**	**1.32**	**3,480**	**3,370**	**3,610**	**0.52**	**0.51**	**0.54**
Caribbean	180	80	330	0.63	0.29	1.16	260	10	710	0.90	0.05	2.48	60	30	100	0.23	0.10	0.36
Central America	200	100	300	0.66	0.35	1.01	60	30	90	0.21	0.09	0.31	50	20	100	0.17	0.07	0.33
North America	6,140	5,990	6,280	1.91	1.86	1.95	6,500	5,540	7,240	2.02	1.72	2.25	2,860	2,860	2,860	0.89	0.89	0.89
South America	2,720	2,340	2,970	0.95	0.82	1.04	710	630	740	0.25	0.22	0.26	510	470	550	0.18	0.16	0.19
Asia	**1,040**	**150**	**1,940**	**0.03**	**0.01**	**0.07**	**17,450**	**2,690**	**32,220**	**0.59**	**0.09**	**1.08**	**11,200**	**1,270**	**21,140**	**0.38**	**0.04**	**0.71**
Central Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East and South-East Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Near and Middle East/South-West Asia	70	30	130	0.02	0.01	0.04	-	-	-	-	-	-	-	-	-	-	-	-
South Asia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Europe	**4,330**	**3,870**	**4,880**	**0.79**	**0.71**	**0.90**	**2,850**	**2,290**	**3,450**	**0.52**	**0.42**	**0.63**	**4,050**	**3,490**	**4,740**	**0.74**	**0.64**	**0.87**
Eastern and South-Eastern Europe	620	290	1,000	0.28	0.13	0.44	720	400	1,060	0.32	0.18	0.47	1,330	840	1,840	0.59	0.37	0.82
Western and Central Europe	3,710	3,580	3,890	1.16	1.12	1.22	2,130	1,900	2,390	0.67	0.59	0.75	2,720	2,650	2,900	0.85	0.83	0.91
Oceania	**430**	**420**	**430**	**1.65**	**1.61**	**1.65**	**350**	**320**	**360**	**1.34**	**1.24**	**1.38**	**420**	**400**	**420**	**1.64**	**1.56**	**1.65**
Australia and New Zealand	420	420	420	2.19	2.19	2.19	250	250	250	1.34	1.34	1.34	410	400	420	2.17	2.12	2.23
Melanesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Micronesia	-	-	-	-	-	-	6	2	11	1.63	0.58	3.15	-	-	-	-	-	-
Polynesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GLOBAL ESTIMATE	**18,200**	**13,870**	**22,850**	**0.37**	**0.28**	**0.47**	**34,160**	**13,420**	**55,240**	**0.70**	**0.27**	**1.13**	**20,570**	**8,990**	**32,340**	**0.42**	**0.18**	**0.66**

Source: UNODC estimates based on annual report questionnaire data and other official sources.

[a] *Cocaine includes cocaine salt, "crack" cocaine and other types such as coca paste, cocaine base, "basuco", "paco" and "merla".* [b] *Amphetamines include both amphetamine and methamphetamine.*

Estimated number and prevalence (percentage) of people who inject drugs and those living with HIV among this group, by region, 2016

Region or subregion	People who inject drugs							HIV among people who inject drugs				
	Estimated number			Prevalence (%)			Data coverage of population aged 15–64 years	Estimated number			Prevalence (%) Best estimate	Data coverage of estimated number of people who inject drugs
	Low	Best	High	Low	Best	High		Low	Best	High		
Africa	**390,000**	**730,000**	**2,310,000**	**0.06**	**0.11**	**0.34**	**57.6%**	**36,000**	**82,000**	**564,000**	**11.2**	**75.5%**
America	**1,860,000**	**2,400,000**	**3,300,000**	**0.28**	**0.36**	**0.50**	**85.2%**	**75,000**	**111,000**	**211,000**	**4.6**	**93.1%**
North America	1,550,000	1,780,000	2,010,000	0.48	0.55	0.63	100%	62,000	71,000	81,000	4.0	100%
Latin America and the Caribbean	310,000	610,000	1,290,000	0.09	0.18	0.37	71.3%	14,000	39,000	129,000	6.4	73.2%
Asia	**3,470,000**	**4,840,000**	**6,300,000**	**0.12**	**0.16**	**0.21**	**94.3%**	**388,000**	**581,000**	**861,000**	**12.0**	**95.3%**
Central Asia and Transcaucasia	400,000	440,000	500,000	0.69	0.76	0.87	93.6%	28,000	33,000	42,000	7.5	93.6%
East and South-East Asia	2,210,000	3,200,000	4,190,000	0.14	0.20	0.26	95.1%	174,000	306,000	510,000	9.6	96.4%
South-West Asia	560,000	740,000	930,000	0.29	0.38	0.48	100%	160,000	212,000	267,000	28.8	100%
Near and Middle East	50,000	190,000	380,000	0.04	0.18	0.36	17.2%	400	800	7,300	0.4	55.8%
South Asia	270,000	280,000	300,000	0.03	0.03	0.03	99.9%	25,000	29,000	34,000	10.3	99.9%
Europe	**2,440,000**	**2,520,000**	**2,660,000**	**0.45**	**0.47**	**0.49**	**99.9%**	**468,000**	**483,000**	**503,000**	**19.1**	**100%**
Eastern and South-Eastern Europe	1,780,000	1,820,000	1,880,000	0.80	0.82	0.85	100%	402,000	409,000	416,000	22.4	100%
Western and Central Europe	650,000	700,000	780,000	0.20	0.22	0.24	99.9%	65,000	74,000	87,000	10.6	99.9%
Oceania	**140,000**	**140,000**	**150,000**	**0.52**	**0.53**	**0.56**	**73.3%**	**1,300**	**1,600**	**1,700**	**1.2**	**73.3%**
Global	**8,300,000**	**10,630,000**	**14,710,000**	**0.17**	**0.22**	**0.30**	**88.4%**	**970,000**	**1,260,000**	**2,140,000**	**11.8**	**94.3%**

Source: Responses to the annual report questionnaire; progress reports of the Joint United Nations Programme on HIV/AIDS (UNAIDS) on the global AIDS response (various years); the former Reference Group to the United Nations on HIV and Injecting Drug Use; published peer-reviewed articles; and government reports.

Note: Prevalence of people who inject drugs is the percentage of the population aged 15–64 years.

Opium/Heroin

Illicit cultivation of opium poppy, 2006–2017 (hectares)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
SOUTH-WEST ASIA												
Afghanistan (best estimate)	165,000	193,000	157,000	123,000	123,000	131,000	154,000	209,000	224,000	183,000	201,000	328,000
lower bound [a]				102,000	104,000	109,000	125,000	173,000	196,000	163,000	182,000	301,000
upper bound [a]				137,000	145,000	155,000	189,000	238,000	247,000	202,000	221,000	355,000
SOUTH-EAST ASIA												
Lao People's Democratic Republic [b] (best estimate)	2,500	1,500	1,600	1,900	3,000	4,100	6,800	3,900	6,200	5,700	..	..
lower bound [a]	2,040	1,230	710	1,100	1,900	2,500	3,100	1,900	3,500	3,900		
upper bound [a]	2,990	1,860	2,700	2,700	4,000	6,000	11,500	5,800	9,000	7,600		
Myanmar [b] (best estimate)	21,500	27,700	28,500	31,700	38,100	43,600	51,000	57,800	57,600	55,500	..	41,000 [c]
lower bound [a]	..	22,500	17,900	20,500	17,300	29,700	38,249	45,710	41,400	42,800		30,200
upper bound [a]	..	32,600	37,000	42,800	58,100	59,600	64,357	69,918	87,300	69,600		51,900
AMERICAS												
Colombia (best estimate)	1,023	715	394	356	341	338	313	298	387	595	462	..
Mexico [d, f] (best estimate)	5,000	6,900	15,000	19,500	14,000	12,000	10,500	11,000	17,000	26,100	..	..
lower bound [a]										21,800		
upper bound [a]										30,400		

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
OTHER												
Other countries [e]	5,977	5,885	10,509	9,479	12,221	16,462	12,282	13,293	11,522	*10,597*	*103,839*	*49,000*
TOTAL (best estimate)	**201,000**	**235,700**	**213,003**	**185,935**	**190,662**	**207,500**	**234,895**	**295,291**	**316,709**	***281,492***	***305,301***	***418,000***
lower bound				152,935	**149,762**	**170,000**	**189,444**	**245,201**	**269,809**	***242,692***	***265,617***	***397,217*** [f]
upper bound				211,835	**233,662**	**249,400**	**287,952**	**338,309**	**372,209**	***320,792***	***346,017***	***497,717*** [f]
TOTAL (best estimate rounded)	**201,000**	**235,700**	**213,000**	**185,900**	**190,700**	**207,500**	**234,900**	**295,300**	**316,700**	***281,500***	***305,300***	***418,000*** [f]

Source: Afghanistan, Lao People's Democratic Republic and Myanmar: national illicit crop monitoring system supported by the United Nations Office on Drugs and Crime (UNODC). Colombia: Government of Colombia. Mexico: up to 2014, estimates derived from surveys by the Government of the United States of America (international narcotics control strategy reports); for 2015, joint Mexico/UNODC project entitled "Monitoring of the illicit cultivation on Mexican territory".

Note: Figures in italics are preliminary and may be revised when updated information becomes available. Two dots indicate that data were unavailable. Information on estimation methodologies and definitions can be found in the online methodology section of the World Drug Report 2018.

[a] *Bound of the statistically derived confidence interval.*

[b] *May include areas that were eradicated after the date of the area survey.*

[c] *Estimate for 2017 only covers the States of Shan and Kachin.*

[d] *Up to 2014, the estimates for Mexico are sourced from the Department of State of the United States. The Government of Mexico does not validate the estimates provided by the United States as they are not part of its official figures and it does not have information on the methodology used to calculate them. Estimates of opium poppy cultivation for the years 2016 and 2017, based on the Mexico/UNODC joint project entitled "Monitoring of the Illicit Cultivation on Mexican Territory", will soon become available.*

[e] *Includes countries with low levels of cultivation (less than 400 hectares in the latest year with available data) and countries with indirect evidence of illicit cultivation (eradication of opium poppy) but no direct measurement. See table "Cultivation of opium poppy and production of opium in other countries, and eradication of opium poppy, 2007-2017". In addition, for 2016 and 2017, best estimates for countries for which data are not available (Lao People's Democratic Republic, Mexico for 2016 and 2017, Myanmar for 2016 and Colombia for 2017) are included in this category.*

Starting in 2008, a new methodology was introduced to estimate opium poppy cultivation and opium/heroin production in countries with no data on illicit cultivation of opium poppy. A detailed description of the estimation methodology is available in the online methodology section of the World Drug Report 2018.

[f] *The figures for 2015, as published in the World Drug Report 2016 (United Nations publication, Sales No. E.16.XI.7), have been revised owing to a statistical adjustment processed by UNODC. These figures are based on the estimation period July 2014-June 2015.*

Potential production of oven–dry opium, 2006–2017 (tons)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
SOUTH-WEST ASIA												
Afghanistan (best estimate)	5,300	7,400	5,900	4,000	3,600	5,800	3,700	5,500	6,400	3,300	4,800	9,000
lower bound [a]					3,000	4,800	2,800	4,500	5,100	2,700	4,000	8,000
upper bound [a]					4,200	6,800	4,200	6,500	7,800	3,900	5,600	10,000
SOUTH-EAST ASIA												
Lao People's Democratic Republic [b, f] (best estimate)	20	9	10	11	18	25	41	23	92	..	..	..
lower bound [g]	16	7	4	7	11	15	18	11	51	84		
upper bound [g]	24	11	16	16	24	36	69	35	133	176		
Myanmar [b] (best estimate)	315	460	410	330	580	610	690	870	670	647	..	550 [h]
lower bound				213	350	420	520	630	481	500		*395*
upper bound				445	820	830	870	1,100	916	820		*706*
AMERICAS												
Colombia (best estimate)	13	14	10	9	8	8	8	11	12	17	13	..
Mexico [c, e] (best estimate)	108	150	325	425	300	250	220	225	360	*499*	..	..
lower bound										*279*		
upper bound										*693*		

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
OTHER												
Other countries [d]	55	58	187	178	224	290	172	182	198	*178*	*1,570*	*950*
TOTAL (best estimate)	5,810	8,091	6,841	4,953	4,730	6,983	4,831	6,810	7,732	*4,771*	*6,383*	*10,500*
lower bound					**3,894**	**5,783**	**3,738**	**5,558**	**6,202**	***3,758***	***5,107***	***9,002***
upper bound					**5,576**	**8,214**	**5,539**	**8,052**	**9,419**	***5,784***	***7,629***	***11,915***
TOTAL (best estimate rounded)	**5,810**	**8,090**	**6,840**	**4,950**	**4,730**	**6,980**	**4,830**	**6,810**	**7,730**	***4,770***	***6,380***	***10,500*** [i]

Source: Afghanistan, Lao People's Democratic Republic and Myanmar: national illicit crop monitoring system supported by the United Nations Office on Drugs and Crime (UNODC). Colombia: National illicit crop monitoring system supported by UNODC. Since 2008, production was calculated based on updated regional yield figures and conversion ratios from the Department of State and the Drug Enforcement Administration of the United States of America. Mexico: up to 2014, estimates derived from surveys by the United States Government; for 2015, UNODC estimate.

Note: Figures in italics are preliminary and may be revised when updated information becomes available. Two dots indicate that data were unavailable. Information on estimation methodologies and definitions can be found in the online methodology section of the World Drug Report 2018.

[a] *Bound of the statistically derived confidence interval.*

[b] *Based on cultivation figures which may include areas eradicated after the date of the area survey.*

[c] *Up to 2014, the estimates are sourced from the Department of State of the United States. The Government of Mexico does not validate the estimates provided by the United States as they are not part of its official figures and it does not have information on the methodology used to calculate them. Estimates of opium production for the years 2016 and 2017, based on the Mexico/UNODC joint project entitled "Monitoring of the Illicit Cultivation on Mexican Territory",will soon become available.*

[d] *Includes countries with low levels of cultivation (less than 400 hectares in the latest year with available data) and countries with indirect evidence of illicit cultivation (eradication of opium poppy) but no direct measurement. See table "Cultivation of opium poppy and production of opium in other countries, and eradication of opium poppy, 2007-2017".*

In addition, for 2016 only, best estimates for countries for which data are not available (Lao People's Democratic Republic, Mexico and Myanmar) are included in this category.

Starting in 2008, a new methodology was introduced to estimate opium poppy cultivation and opium/heroin production in countries with no data on illicit cultivation of opium poppy. These estimates are higher than the previous figures but have a similar order of magnitude. A detailed description of the estimation methodology is available in the online methodology section of the World Drug Report 2017.

[e] *The figures for 2015, as published in the World Drug Report 2016 (United Nations publication, Sales No. E.16.XI.7), have been revised owing to a statistical adjustment processed by UNODC. The Government of Mexico does not validate any opium production estimates. The production figures will be presented once yield data from the joint Mexico/UNODC project entitled "Monitoring of the illicit cultivation on Mexican territory" become available. Opium production estimated by UNODC for 2015 is based on: (a) the area under cultivation, established by the joint project of the Government of Mexico and UNODC; (b) yield data, based on yield studies conducted by the United States in Mexico over the period 2001-2003. The opium production figures shown for 2015 are preliminary and, for methodological reasons, are not comparable with the production figures over the period 1998-2014. As a result of the Mexico/UNODC joint project entitled "Monitoring of the Illicit Cultivation on Mexican Territory", poppy crop estimate figures for the years 2016 and 2017 will become available soon.*

[f] *Owing to the late timing of the monitoring activities in 2013, the survey may not have captured illicit cultivation in this year in its entirety.*

[g] *Bound of the statistically derived confidence interval, with the exception of 2015. The figures for 2015 represent independently derived upper and lower estimates; the midpoint was used for the calculation of the global total.*

[h] *Estimate for 2017 covers only the States of Shan and Kachir.*

[i] *Preliminary estimate*

Cultivation of opium poppy and production of opium in other countries, and eradication of opium poppy, 2007–2017

	Indicator	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Guatemala	Cultivation (hectares)						220	310	640	260	310	
Guatemala	Production (tons)						4	6	14	6	6	
Pakistan	Cultivation (hectares)	1,701	1,909	1,779	1,721	362	382	493	217	372	130	
Pakistan	Production (tons)	43	48	44	43	9	9	12	5	9	3	
Thailand	Cultivation (hectares)	205	288	211	289	289	209	265			399	
Thailand	Production (tons)	3	5	3	5	6	3	4				
Afghanistan	Eradication (hectares)	19,047	5,480	5,351	2,316	3,810	9,672	7,348	2,692	3,760	355	750
Algeria	Eradication (plants)				868	340	204	2,721	7,470			
Algeria	Seizure poppy plants (in kg equivalents)	7,675	7,761	962	87	34	20.4	272.1			106	
Argentina	Seizure poppy plants (in kg equivalents)	5.8									0.2	
Armenia	Seizure poppy plants (in kg equivalents)								0.18	0.13	60	
Australia	Seizure poppy plants (in kg equivalents)										37	
Austria	Seizure poppy plants (in kg equivalents)		8.76	13.83		4.60	1.91	2.07	1.41		0.05	
Azerbaijan	Eradication (hectares)					2.26	0.21	0.40	0.45			
Azerbaijan	Eradication (plants)					201	2,628	34	284			

	Indicator	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Bangladesh	Eradication (hectares)				8	22						
Bangladesh	Seizure poppy plants (in kg equivalents)			145,021								
Belarus	Eradication (hectares)				14	52	26				92	
Belarus	Seizure poppy plants (in kg equivalents)					59		81	51		94	
Canada	Eradication (hectares)				7	7						
Canada	Eradication (plants)				60,000	60,000						
Canada	Seizure poppy plants (in kg equivalents)				6600	9.3		7.3			85.9	
China	Eradication (hectares)										6	
Colombia	Eradication (hectares)	375	381	546	712	294	320	514	813	613	450	
Cyprus	Seizure poppy plants (in kg equivalents)									6		
Czechia	Seizure poppy plants (in kg equivalents)									40		
Ecuador	Eradication (plants)		74,555	115,580	257,306	44,200	4,025,800	2,554,865	2,023,385	183,573	1,207,147	
Ecuador	Seizure poppy plants (in kg equivalents)		7,456	11,558	12,865	2,210	185,490	75,765				
Egypt	Eradication (hectares)	89	121	98	222	1		3		98	105	
Egypt	Seizure poppy plants (in kg equivalents)	161										

	Indicator	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Georgia	Seizure poppy plants (in kg equivalents)								8			
Greece	Eradication (plants)						192	60	144	145	624	
Guatemala	Eradication (hectares)	449	536	1,345	918	1,490	590	2,568	1,197	430	45	
Guatemala	Eradication (plants)										17,643,447	
Guatemala	Seizure poppy plants (in kg equivalents)	24,153,765	27,880,441	69,228,416	54,612,442			10,935,532	864,150			
Hungary	Seizure poppy plants (in kg equivalents)						1,502	2,152				
India	Eradication (hectares)	8,000	624	2,420	3,052	5,746	1,332	865	1,636	3,461	2,875	
India	Seizure poppy plants (in kg equivalents)								3,770			
Iran (Islamic Republic of)	Eradication (hectares)				2.00		1	1	1		1	
Iran (Islamic Republic of)	Eradication (plants)						140,000	100,000	120,000		90,000	
Italy	Eradication (plants)				1,797	2,007	6,717					
Italy	Seizure poppy plants (in kg equivalents)						716	375	168	30	1,098	
Japan	Seizure poppy plants (in kg equivalents)		535	104	90	26	20	11				
Kazakhstan	Eradication (hectares)										0.2	
Kazakhstan	Eradication (plants)					1,692			2,254	19,510	15,515	

	Indicator	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Kazakhstan	Seizure poppy plants (in kg equivalents)		68	127	105	90	30	2	8	298		
Kyrgyzstan	Seizure poppy plants (in kg equivalents)	724	102	344	58	200	399	147	63	55		
Lao People's Democratic Republic	Eradication (hectares)	779	575	651	579	662	707	397		809		
Latvia	Seizure poppy plants (in kg equivalents)	75	23	31		1	12	7	9	43		
Lebanon	Eradication (hectares)	8		21	14	4		6	1			
Lithuania	Seizure poppy plants (in kg equivalents)	26	45	16								
Lithuania	Eradication (hectares)	2.40										
Mexico	Eradication (hectares)	11,046	13,095	14,753	15,491	16,389	15,726	14,662	21,644	25,960	22,437	
Mexico	Seizure poppy plants (in kg equivalents)		7,263	7,964	9,335	10,101	9,572	10,209	14,812	17,948	16,401	
Myanmar	Eradication (hectares)	3,662	4,820	4,087	8,267	7,058	23,718	12,288	15,188	13,450	7,561	3,533
Nepal	Eradication (hectares)		21	35								
Oman	Eradication (hectares)							6				
Pakistan	Eradication (hectares)	614	0	105	68	1,053	592	568	1,010	605	1,470	
Pakistan	Seizure poppy plants (in kg equivalents)	6,880	81,675	25,550				4,650	5,976	4,576	1,023	
Peru	Eradication (hectares)	28	23	32	21							
Philippines	Seizure poppy plants (in kg equivalents)	250										
Poland	Eradication (hectares)			9								

	Indicator	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Poland	Seizure poppy plants (in kg equivalents)	207										
Portugal	Seizure poppy plants (in kg equivalents)					164		1.6	9.4			
Republic of Korea	Eradication (plants)							25,369				
Republic of Korea	Seizure poppy plants (in kg equivalents)				3,855					8,013	9,771	
Republic of Moldova	Eradication (plants)					32,413	11,255					
Republic of Moldova	Seizure poppy plants (in kg equivalents)	95	79	26,075								
Russian Federation	Eradication (hectares)	2.5		3.3		1.4	0.6	0.9	1.1	0.6	0.8	
Russian Federation	Eradication (plants)								645			
Russian Federation	Seizure poppy plants (in kg equivalents)	1,863	2,799	2,807	2,575	4,273	3,196	2,216	1,438	1,043	270	
Spain	Seizure poppy plants (in kg equivalents)				13		10	30	219		0.02	
State of Palestine	Seizure poppy plants (in kg equivalents)					4.2	5.8	1.2	17.8			
Tajikistan	Eradication (plants)					13	5,400	103				
Thailand	Eradication (hectares)	220	285	201	278	208	205	264			319	
Ukraine	Eradication (hectares)		28		436			39		48	164	
Ukraine	Eradication (plants)				1,185,118		474,000	22,800,000				
Ukraine	Seizure poppy plants (in kg equivalents)		164,000		4,162		7.4		384	930		

	Indicator	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Uzbekistan	Eradication (hectares)					1.0		1.0	0.3	0.3	0.3	
Uzbekistan	Seizure poppy plants (in kg equivalents)	169	138	687	896	413	330	336	406	205	863	
Viet Nam	Eradication (hectares)	38	99	31		38	35	25	19	18		

Source: United Nations Office on Drugs and Crime annual report questionnaire, government reports, reports of regional bodies, and international narcotics control strategy reports of the United States of America.

Global manufacture of heroin from global illicit opium production, 2006–2017 (tons)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total potential opium production	5,810	8,091	6,841	4,953	4,730	6,983	4,831	6,810	7,723	4,771	6,383	*10,500*
Potential opium not processed into heroin	1,786	3,078	2,360	1,680	1,728	3,400	1,850	2,600	2,450	1,360	2,510	*1,100-1,400*
Potential opium processed into heroin	4,024	5,012	4,481	3,273	3,002	3,583	2,981	4,210	5,273	3,411	3,873	*9,100-9,400*
Total potential heroin manufacture *	553	686	600	427	383	467	377	555	542	327	408	*700-1,050*

Notes: The calculation shows the potential amount of heroin that could have been manufactured out of the opium produced in a given year; it does not take into account changes in opium inventories, which may also be used for the manufacture of heroin and which may be important. Afghanistan is the only country for which the proportion of potential opium production not converted into heroin within the country is estimated. For all other countries, for the purposes of this table, it is assumed that all opium produced is converted into heroin. If all of the opium produced in Afghanistan in 2016 had been converted into heroin, total potential heroin manfuacture would have amounted to 668 tons at the global level (510 tons in Afghanistan).

The amount of heroin produced in Afghanistan is calculated using two parameters that may change: (a) the distribution between opium that is not processed and opium processed into heroin; and (b) the conversion ratio into heroin. The first parameter is indirectly estimated, based on seizures of opium versus seizures of heroin and morphine reported by Afghanistan and neighbouring countries. For 2016, this calculation results in a proportion of 57 per cent of potential opium production in Afghanistan converted into heroin. For the second parameter, from 2005 to 2013, a conversion ratio of opium to morphine/heroin of 7:1 was used, based on interviews conducted with Afghan morphine/heroin "cooks", on an actual heroin production exercise conducted by two (illiterate) Afghan heroin "cooks", documented by the German Bundeskriminalamt in Afghanistan in 2003 (published in Bulletin on Narcotics, vol. LVII, Nos. 1 and 2, 2005, pp. 11-31) and United Nations Office on Drugs and Crime (UNODC) studies on the morphine content of Afghan opium (12.3 per cent over the period 2010-2012, down from 15 per cent over the period 2000-2003). From 2014 to 2016, a different approach to the conversion was adopted, reflecting updated information on morphine content and a different method for taking purity into account. The revised approach uses a ratio of 18.5 kg of opium for 1 kg of 100 per cent pure white heroin hydrochloride (see Afghanistan Opium Survey 2014, UNODC, November 2014); based on an estimated export quality of 51 per cent in 2016, this translates into a ratio of 9.5 kg (range: 9-10 kg) of opium for 1 kg of export-quality heroin (for 2016). For more details, see Afghanistan Opium Survey 2016 (UNODC, October 2016). For countries other than Afghanistan, a "traditional" conversion ratio of opium to heroin of 10:1 is used. The ratios will be adjusted when improved information becomes available. Figures in italics are preliminary and may be revised when updated information becomes available.

For 2017, new evidence has become available of higher purities of heroin produced in Afghanistan. Ranges in the reported figures reflect different purities and the upper and lower bounds of the 95% confidence interval around opium production estimates in Afghanistan in 2017. For more information, see the Afghanistan Opium Survey 2017 (UNODC, May 2018).

** Heroin manufacture estimated at export purity.*

Coca/Cocaine

Global illicit cultivation of coca bush, 2006–2016 (hectares)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bolivia (Plurinational State of)	27,500	28,900	30,500	30,900	31,000	27,200	25,300	23,000	20,400	20,200	23,100
Colombia [a]	78,000	99,000	81,000	73,000	62,000	64,000	48,000	48,000	69,000	96,000	146,000
Peru [b]	51,400	53,700	56,100	59,900	61,200	64,400					
Peru [c]						62,500	60,400	49,800	42,900	40,300	43,900
Total	**156,900**	**181,600**	**167,600**	**163,800**	**154,200**	**155,600 [d]**	**133,700**	**120,800**	**132,300**	**156,500**	**213,000**

Source: Plurinational State of Bolivia: national illicit crop monitoring system supported by the United Nations Office on Drugs and Crime (UNODC). Colombia: national illicit crop monitoring system supported by UNODC. Peru: national illicit crop monitoring system supported by UNODC.

Note: Different area concepts and their effect on comparability were presented in the World Drug Report 2012 (United Nations publication, Sales No. E.12.XI.1, p. 41-42). Efforts to improve the comparability of estimates between countries continue; since 2011 the net area under coca bush cultivation on the reference date of 31 December was estimated for Peru, in addition to Colombia. The estimate presented for the Plurinational State of Bolivia represents the area under coca cultivation as interpreted on satellite imagery.

[a] *Net area on 31 December.*

[b] *Figures represent the area under coca cultivation as interpreted on satellite imagery.*

[c] *Net area on 31 December, deducting fields eradicated after satellite imagery was taken.*

[d] *The global coca cultivation figure was calculated with the "area as interpreted on satellite imagery" for Peru.*

Reported eradication of coca bush, 2007–2016

	Method of eradication	Unit	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bolivia (Plurinational State of)	manual	hectare	6,269	5,484	6,341	8,200	10,509	11,044	11,407	11,144	11,020	6,577
Colombia	manual	hectare	66,392	96,003	60,565	43,804	35,201	30,456	22,121	11,703	13,473	17,642
	spraying	hectare	153,134	133,496	104,772	101,940	103,302	100,549	47,052	55,532	37,199	0
Peru	manual	hectare	11,056	10,143	10,025	12,033	10,290	14,171	23,785	31,205	35,868	30,150
Ecuador	manual	hectare	12	12	6	3	14	..	..	..	..	
		plants	130,000	152,000	57,765	3,870	55,030	122,656	41,996	15,874	45,266	20,896

Source: UNODC annual report questionnaire and government reports.

Note: The totals for Bolivia (Plurinational State of) include voluntary and forced eradication. The totals for Peru include voluntary and forced eradication.Reported eradication refers to the sum of all areas eradicated in a year, including repeated eradication of the same fields. Two dots indicate that data are not available.

Potential manufacture of 100 per cent pure cocaine, 2006–2016 (tons)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bolivia (Plurinational state of)	94	*104*	*113*	..	..	..	..	..	..	..	..
Colombia	809	683	471	488	424	384	333	290	442	646	866
Peru	*280*	*290*	*302*	..	..	..	..	..	..	..	..
Total based on "old" conversion ratios [a]	**1,183**	**1,077**	**886**	**920**	**862**	**815**	**738**	**662**	**746**	**937**	**1,198**
Total based on "new" conversion ratios [a]	***1,381***	***1,317***	***1,143***	***1,188***	***1,134***	***1,090***	***997***	***902***	***943***	***1,125***	***1,410***

Source: Plurinational State of Bolivia: own calculations based on coca leaf yield surveys by the United Nations Office on Drugs and Crime (UNODC) (Yungas de La Paz) and scientific studies by the Drug Enforcement Administration of the United States of America (Chapare). Colombia: UNODC/Government of Colombia. Peru: own calculations based on coca leaf to cocaine conversion ratio from scientific studies by the Drug Enforcement Administration. Detailed information on the ongoing revision of conversion ratios and cocaine laboratory efficiency is available in the *World Drug Report 2010* (United Nations publication, Sales No. E.10.XI.13), p. 249.

[a] *Conversion of areas under coca cultivation into coca leaf and then into cocaine hydrochloride, taking yields, amounts of coca leaf used for licit purposes and cocaine laboratory efficiency into account.*

Notes: Owing to a lack of updated conversion factors in Bolivia (Plurinational State of) and Peru, no final estimates of the level of cocaine production can be provided. With respect to data published in the World Drug Report 2016 (United Nations publication, Sales No. E.16.XI.7), the following amendments have been made: (a) data for Colombia (2005-2008) have been revised in order to ensure a consistent implementation of revisions to the methodology, affecting the way coca production is calculated, for the entire time series 2005-2015 (for details, see Colombia Coca Cultivation Survey Report 2014 (UNODC, 2015) and Colombia Survey of territories affected by illicit crops 2015, Annex 3 (UNODC 2016)); (b) totals for 2009-2012 based on "old" and "new" conversion ratios have been revised to rectify minor inaccuracies in data processing. Figures in italics are subject to revision. Two dots indicate that data are not available. Information on estimation methodologies and definitions can be found in the online methodology section of the World Drug Report 2018.

Cannabis

Cannabis cultivation, production and eradication, latest year available from the period 2011–2016

Year	Country	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2012	Afghanistan	resin	outdoors	10,000			1,400		
2016	Albania	herb	outdoors					2,536,288	5,205
2014	Algeria	resin	outdoors					2,522	
2016	Armenia	herb	outdoors	0.50 [a]	0.50	0.00		757	20
2016	Australia	herb	indoors					31,266	408
2016	Australia	herb	outdoors					22,257	1,021
2015	Austria	herb	outdoors	3.00 [a]	3.00	0.00			
2014	Azerbaijan	herb	outdoors	17.50 [a]	17.50	0.00		14,889	195
2013	Azerbaijan	herb	outdoors	23.95 [a]	23.95	0.00	263.96	8,469	151
2015	Bahamas	herb	outdoors					17,270	
2011	Bangladesh	herb	outdoors					54,244	
2012	Bangladesh	herb	outdoors					39,848	
2013	Bangladesh	herb	outdoors					35,012	
2014	Bangladesh	herb	outdoors					35,988	
2015	Bangladesh	herb	outdoors					39,967	
2016	Bangladesh	herb	outdoors					47,104	
2017	Bangladesh	herb	outdoors					69,989	
2016	Belarus	herb	outdoors		123.80				1,945
2016	Belarus	herb	indoors						28
2015	Belgium	herb	indoors					345,518	1,164
2015	Belgium	herb	outdoors					4,885	93
2015	Belize	herb	outdoors					50,897	
2016	Bolivia (Plurinational State of)	herb	outdoors		14.60				35
2016	Bosnia and Herzegovina	herb	outdoors		1,680.00				
2016	Bosnia and Herzegovina	herb	indoors		39.00				
2014	Brazil	herb	outdoors		44.01			1,364,316	
2015	Bulgaria	herb	indoors					323	
2015	Bulgaria	herb	outdoors				37.77	9,488	

Year	Country	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2016	Chile	herb	indoors					26,988	2,740
2016	Chile	herb	outdoors					58,950	264
2016	China	herb	outdoors		9.80			1,390,000	
2016	Colombia	herb	outdoors		135.00				
2016	Costa Rica	herb	outdoors		17.59			2,122,244	201
2016	Costa Rica	herb	indoors					678.00	5
2016	Côte d'Ivoire	herb	outdoors					5	
2016	Czechia	herb	indoors					53,549	229
2016	Czechia	herb	outdoors					4,111	
2014	Dominican Republic	herb	outdoors	6.00 [a]	6.00	0.00	0.21	111	8
2016	Ecuador	herb	outdoors					224	34
2015	Egypt	herb/resin	outdoors		140.00				
2016	El Salvador	herb	outdoors			1.00		227	25
2014	France	herb	outdoors					158,592	837
2015	Germany	herb	indoors					135,925	786
2015	Germany	herb	outdoors					9,136	127
2016	Greece	herb	indoors					16,554	
2016	Greece	herb	oudoors					39,151	
2016	Guatemala	herb	outdoors		9.00			3,138,298	427
2015	Guyana	herb	outdoors	20.00	9.40	10.60	1,000.00	419,700	19
2016	Honduras	herb	indoors					7	2
2016	Honduras	herb	oudoors					24,253	19
2016	China, Hong Kong SAR	herb	indoors					329	1
2016	Hungary	herb	indoors					5,000	3
2016	Hungary	herb	outdoors					2,000	20
2013	Iceland	herb	indoors					6,652	323
2016	India	herb	outdoors		3,414.74				
2016	Indonesia	herb	outdoors	482.00 [a]	482.00	0.00			
2016	Ireland	herb	indoors					7,273	
2014	Italy	herb	indoors					51,534	639
2014	Italy	herb	outdoors					70,125	1,134

Year	Country	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2012	Jamaica	herb	outdoors					456	382
2016	Kazakhstan	herb	outdoors	18.00 [a]	18.00	0.00		170,000	202
2016	Kenya	herb	outdoors	12.00				8,747	46
2015	Kyrgyzstan	herb	outdoors	5,014.00		5,014.00			
2016	Latvia	herb	indoors					557	35
2016	Latvia	herb	outdoors					78	6
2015	Lebanon	herb	outdoors	3,500.00		3,500.00			
2016	Lithuania	herb	indoors						4
2015	Madagascar	herb	outdoors		11.00			21,325	
2013	Malta	herb	indoors					27	
2016	Mexico	herb	outdoors		5,478.42		6,574,104.0		38,432
2013	Mongolia	herb	outdoors	15,000.00	4,000.00	11,000.00		4,000	4,000
2016	Morocco	plant	outdoors	47,000.00	395.00	46,605.00			
2016	Morocco	herb	outdoors				35,652.83		
2016	Morocco	resin	outdoors				713.00		
2014	Myanmar	herb	outdoors	15.00	10.00	5.00			3
2016	Netherlands	herb	indoors					994,068	5,856
2016	New Zealand	herb	indoors					18,903	607
2016	New Zealand	herb	outdoors					104,725	
2014	Nicaragua	herb	outdoors		0.30		1,507.00	3,014	30
2016	Nigeria	herb	outdoors		718.78				65
2015	Norway	herb	indoors		0.04			4,000	30
2013	Panama	herb	indoors	0.50 [a]	0.50	0.00		37	2
2013	Panama	herb	outdoors	10.50 [a]	10.50	0.00		78,633	2
2016	Paraguay	plant	outdoors	1,298.50 [a]	1,298.50	0.00		5,656,266	4
2016	Paraguay	herb	outdoors				1,298.50		
2016	Paraguay	resin	outdoors				1.15		
2016	Peru	herb	outdoors		87.83			1,429,749	
2016	Philippines	herb	outdoors		8.67			24,635,153	337
2016	Poland	herb	indoors					146,755	1,403
2016	Poland	herb	indoors/ outdoors					4,585	219

Year	Country	Product	Outdoors/ indoors	Area cultivated (ha)	Area eradicated (ha)	Harvestable area (ha)	Production (tons)	Plants eradicated	Sites eradicated
2013	Republic of Korea	herb	outdoors					8,072	
2014	Republic of Moldova	herb	outdoors	100.00	59.00	41.00	10,000.00	200,548	
2014	Republic of Moldova	herb	indoors		41.00				
2016	Romania	herb	indoors					1,433	41
2016	Romania	herb	outdoors		6.99				42
2016	Russian Federation	herb	outdoors	7.61 [a]	7.61	0.00	68.64		1,143
2016	Russian Federation	herb	indoors		0.66				788
2015	Serbia	herb	outdoors				0.05		
2013	Sierra Leone	herb	outdoors	190.00		190.00		190	3
2016	Slovakia	herb	indoors					385	
2014	Slovenia	herb	indoors					9,223	118
2014	Slovenia	herb	outdoors					1,844	
2015	Spain	herb	indoors					244,772	108
2015	Spain	herb	outdoors					135,074	44
2014	Sudan	herb	outdoors	8.00 [a]	8.00	0.00	345.00		
2014	Swaziland	herb	outdoors	1,500.00	1,069.50	430.50		3,000,000	210
2014	Sweden	herb	indoors					10,000	56
2015	Sweden	herb	outdoors				182.00		
2016	Switzerland	herb	indoors					11,386	83
2012	Tajikistan	herb	outdoors					2,180,121	
2016	Thailand	herb	outdoors	1.00 [a]	1.00	0.00	7.50		1
2015	Trinidad and Tobago	herb	outdoors		0.31			375,925	58
2012	Uganda	herb	outdoors	150.00	88.00	62.00			5
2016	Ukraine	herb	outdoors	91.00 [a]	91.00	0.00			
2016	United States of America	herb	indoors					406,125	1,865
2016	United States of America	herb	outdoors					4,940,596	5,513
2016	Uruguay	herb	indoors					661	
2016	Uzbekistan	herb	outdoors	0.20 [a]	0.20	0.00			586
2015	Viet Nam	herb	oudoors		1.00				

Source: United Nations Office on Drugs and Crime annual report questionnaire, government reports and and international narcotics control strategy reports of the United States of America.

[a] *Area identified by the authorities for eradication.*

GLOSSARY

amphetamine-type stimulants — a group of substances composed of synthetic stimulants controlled under the Convention on Psychotropic Substances of 1971 and from the group of substances called amphetamines, which includes amphetamine, methamphetamine, methcathinone and the "ecstasy"-group substances (3,4-methylenedioxymethamphetamine (MDMA) and its analogues).

amphetamines — a group of amphetamine-type stimulants that includes amphetamine and methamphetamine.

annual prevalence — the total number of people of a given age range who have used a given drug at least once in the past year, divided by the number of people of the given age range, and expressed as a percentage.

coca paste (or coca base) — an extract of the leaves of the coca bush. Purification of coca paste yields cocaine (base and hydrochloride).

"crack" cocaine — cocaine base obtained from cocaine hydrochloride through conversion processes to make it suitable for smoking.

cocaine salt — cocaine hydrochloride.

drug use — use of controlled psychoactive substances for non-medical and non-scientific purposes, unless otherwise specified.

new psychoactive substances — substances of abuse, either in a pure form or a preparation, that are not controlled under the Single Convention on Narcotic Drugs of 1961 or the 1971 Convention, but that may pose a public health threat. In this context, the term "new" does not necessarily refer to new inventions but to substances that have recently become available.

opiates — a subset of opioids comprising the various products derived from the opium poppy plant, including opium, morphine and heroin.

opioids — a generic term applied to alkaloids from opium poppy (opiates), their synthetic analogues (mainly prescription or pharmaceutical opioids) and compounds synthesized in the body.

problem drug users — people who engage in the high-risk consumption of drugs; for example, people who inject drugs, people who use drugs on a daily basis and/or people diagnosed with drug use disorders (harmful use or drug dependence), based on clinical criteria as contained in the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association, or the International Classification of Diseases and Related Health Problems (tenth revision) of the World Health Organization.

people who suffer from drug use disorders/people with drug use disorders — a subset of people who use drugs. People with drug use disorders need treatment, health and social care and rehabilitation. Harmful use of substances and dependence are features of drug use disorders.

harmful use of substances — defined in the International Statistical Classification of Diseases and Related Health Problems (tenth revision) as a pattern of use that causes damage to physical or mental health.

dependence — defined in the International Statistical Classification of Diseases and Related Health Problems (tenth revision) as a cluster of physiological, behavioural and cognitive phenomena in which the use of a substance or a class of substances takes on a much higher priority for a given individual than other behaviours that once had greater value. A central descriptive characteristic of dependence syndrome is the desire (often strong, sometimes overpowering) to take psychoactive drugs.

substance or drug use disorders — the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association also refers to "drug or substance use disorder" as patterns of symptoms resulting from the use of a substance despite experiencing problems as a result of using substances. Depending on the number of symptoms identified, substance use disorder may vary from moderate to severe.

prevention of drug use and treatment of drug use disorders — the aim of "prevention of drug use" is to prevent or delay the initiation of drug use, as well as the transition to drug use disorders. Once a person develops a drug use disorder, treatment, care and rehabilitation are needed.

REGIONAL GROUPINGS

The World Drug Report uses a number of regional and subregional designations. These are not official designations, and are defined as follows:

- East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, Uganda and United Republic of Tanzania
- North Africa: Algeria, Egypt, Libya, Morocco, South Sudan, Sudan and Tunisia
- Southern Africa: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe
- West and Central Africa: Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone and Togo
- Caribbean: Antigua and Barbuda, Bahamas, Barbados, Bermuda, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines and Trinidad and Tobago
- Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama
- North America: Canada, Mexico and United States of America
- South America: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela (Bolivarian Republic of)
- Central Asia and Transcaucasia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- East and South-East Asia: Brunei Darussalam, Cambodia, China, Democratic People's Republic of Korea, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Singapore, Thailand, Timor-Leste and Viet Nam
- South-West Asia: Afghanistan, Iran (Islamic Republic of) and Pakistan
- Near and Middle East: Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, United Arab Emirates and Yemen
- South Asia: Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka
- Eastern Europe: Belarus, Republic of Moldova, Russian Federation and Ukraine
- South-Eastern Europe: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, Romania, Serbia, the former Yugoslav Republic of Macedonia and Turkey
- Western and Central Europe: Andorra, Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom of Great Britain and Northern Ireland
- Oceania: Australia, Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu and small island territories

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UNODC Research

Following last year's 20th anniversary edition, the *World Drug Report 2018* is again presented in a special five-booklet format designed to enhance reader friendliness while maintaining the wealth of information contained within.

Booklet 1 summarizes the content of the four subsequent substantive booklets and presents policy implications drawn from their findings. Booklet 2 provides a global overview of the latest estimates of and trends in the supply, use and health consequences of drugs. Booklet 3 examines current estimates of and trends in the cultivation, production and consumption of the three plant-based drugs (cocaine, opiates and cannabis), reviews the latest developments in cannabis policies and provides an analysis of the global synthetic drugs market, including new psychoactive substances. Booklet 4 looks at the extent of drug use across age groups, particularly among young and older people, by reviewing the risks and vulnerabilities to drug use in young people, the health and social consequences they experience and their role in drug supply, as well as highlighting issues related to the health care needs of older people who use drugs. Finally, Booklet 5 focuses on the specific issues related to drug use among women, including the social and health consequences of drug use and access to treatment by women with drug use disorders; it also discusses the role played by women in the drug supply chain.

Like all previous editions, the *World Drug Report 2018* is aimed at improving the understanding of the world drug problem and contributing towards fostering greater international cooperation for countering its impact on health and security.

The statistical annex is published on the UNODC website:
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UNODC Research

ANALYSIS OF DRUG MARKETS

Opiates, cocaine, cannabis, synthetic drugs

WORLD DRUG REPORT 2018

3

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PREFACE

Both the range of drugs and drug markets are expanding and diversifying as never before. The findings of this year's *World Drug Report* make clear that the international community needs to step up its responses to cope with these challenges.

We are facing a potential supply-driven expansion of drug markets, with production of opium and manufacture of cocaine at the highest levels ever recorded. Markets for cocaine and methamphetamine are extending beyond their usual regions and, while drug trafficking online using the darknet continues to represent only a fraction of drug trafficking as a whole, it continues to grow rapidly, despite successes in shutting down popular trading platforms.

Non-medical use of prescription drugs has reached epidemic proportions in parts of the world. The opioid crisis in North America is rightly getting attention, and the international community has taken action. In March 2018, the Commission on Narcotic Drugs scheduled six analogues of fentanyl, including carfentanil, which are contributing to the deadly toll. This builds on the decision by the Commission at its sixtieth session, in 2017, to place two precursor chemicals used in the manufacture of fentanyl and an analogue under international control.

However, as this *World Drug Report* shows, the problems go far beyond the headlines. We need to raise the alarm about addiction to tramadol, rates of which are soaring in parts of Africa. Non-medical use of this opioid painkiller, which is not under international control, is also expanding in Asia. The impact on vulnerable populations is cause for serious concern, putting pressure on already strained health-care systems.

At the same time, more new psychoactive substances are being synthesized and more are available than ever, with increasing reports of associated harm and fatalities.

Drug treatment and health services continue to fall short: the number of people suffering from drug use disorders who are receiving treatment has remained low, just one in six. Some 450,000 people died in 2015 as a result of drug use. Of those deaths, 167,750 were a direct result of drug use disorders, in most cases involving opioids.

These threats to health and well-being, as well as to security, safety and sustainable development, demand an urgent response.

The outcome document of the special session of the General Assembly on the world drug problem held in 2016 contains more than 100 recommendations on promoting evidence-based prevention, care and other measures to address both supply and demand.

We need to do more to advance this consensus, increasing support to countries that need it most and improving international cooperation and law enforcement capacities to dismantle organized criminal groups and stop drug trafficking.

The United Nations Office on Drugs and Crime (UNODC) continues to work closely with its United Nations partners to assist countries in implementing the recommendations contained in the outcome document of the special session, in line with the international drug control conventions, human rights instruments and the 2030 Agenda for Sustainable Development.

In close cooperation with the World Health Organization, we are supporting the implementation of the *International Standards on Drug Use Prevention* and the international standards for the treatment of drug use disorders, as well as the guidelines on treatment and care for people with drug use disorders in contact with the criminal justice system.

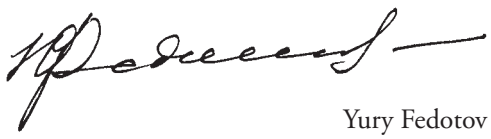
The World Drug Report 2018 highlights the importance of gender- and age-sensitive drug policies, exploring the particular needs and challenges of women and young people. Moreover, it looks into

increased drug use among older people, a development requiring specific treatment and care.

UNODC is also working on the ground to promote balanced, comprehensive approaches. The Office has further enhanced its integrated support to Afghanistan and neighbouring regions to tackle record levels of opiate production and related security risks. We are supporting the Government of Colombia and the peace process with the Revolutionary Armed Forces of Colombia (FARC) through alternative development to provide licit livelihoods free from coca cultivation.

Furthermore, our Office continues to support efforts to improve the availability of controlled substances for medical and scientific purposes, while preventing misuse and diversion – a critical challenge if we want to help countries in Africa and other regions come to grips with the tramadol crisis.

Next year, the Commission on Narcotic Drugs will host a high-level ministerial segment on the 2019 target date of the 2009 Political Declaration and Plan of Action on International Cooperation towards an Integrated and Balanced Strategy to Counter the World Drug Problem. Preparations are under way. I urge the international community to take this opportunity to reinforce cooperation and agree upon effective solutions.



Yury Fedotov
Executive Director
United Nations Office on Drugs and Crime

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EXPLANATORY NOTES

The boundaries and names shown and the designations used on maps do not imply official endorsement or acceptance by the United Nations. A dotted line represents approximately the line of control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Disputed boundaries (China/India) are represented by cross-hatch owing to the difficulty of showing sufficient detail.

The designations employed and the presentation of the material in the *World Drug Report* do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities or concerning the delimitation of its frontiers or boundaries.

Countries and areas are referred to by the names that were in official use at the time the relevant data were collected.

All references to Kosovo in the *World Drug Report*, if any, should be understood to be in compliance with Security Council resolution 1244 (1999).

Since there is some scientific and legal ambiguity about the distinctions between "drug use", "drug misuse" and "drug abuse", the neutral terms "drug use" and "drug consumption" are used in the *World Drug Report*. The term "misuse" is used only to denote the non-medical use of prescription drugs.

All uses of the word "drug" in the *World Drug Report* refer to substances controlled under the international drug control conventions.

All analysis contained in the *World Drug Report* is based on the official data submitted by Member States to the United Nations Office on Drugs and Crime through the annual report questionnaire unless indicated otherwise.

The data on population used in the *World Drug Report* are taken from: *World Population Prospects: The 2017 Revision* (United Nations, Department of Economic and Social Affairs, Population Division).

References to dollars ($) are to United States dollars, unless otherwise stated.

References to tons are to metric tons, unless otherwise stated.

The following abbreviations have been used in the present booklet:

ATS	amphetamine-type stimulants
EMCDDA	European Monitoring Centre for Drugs and Drug Addiction
Europol	European Union Agency for Law Enforcement Cooperation
4-FA	4-fluoroamphetamine
MDMA	3,4-methylenedioxymethamphetamine
3-MMC	3-methylmethcathinone
NPS	new psychoactive substances
PWID	people who inject drugs
UNODC	United Nations Office on Drugs and Crime
WHO	World Health Organization
SAMHSA	Substance Abuse and Mental Health Administration

KEY FINDINGS

Afghan opium poppy cultivation drives record opiate production

Total global opium production jumped by 65 per cent from 2016 to 2017, to 10,500 tons, easily the highest estimate recorded by UNODC since it started estimating global opium production at the beginning of the twenty-first century.

A marked increase in opium poppy cultivation and a gradual increase in opium poppy yields in Afghanistan resulted in opium production in the country reaching 9,000 tons in 2017, an increase of 87 per cent from the previous year. Among the drivers of that increase were political instability, lack of government control and reduced economic opportunities for rural communities, which may have left the rural population vulnerable to the influence of groups involved in the drug trade.

The surge in opium poppy cultivation in Afghanistan meant that the total area under opium poppy cultivation worldwide increased by 37 per cent from 2016 to 2017, to almost 420,000 ha. More than 75 per cent of that area is in Afghanistan.

Overall seizures of opiates rose by almost 50 per cent from 2015 to 2016. The quantity of heroin seized globally reached a record high of 91 tons in 2016. Most opiates were seized near the manufacturing hubs in Afghanistan.

Towards a multifaceted global opioid crisis

The non-medical use of pharmaceutical opioids is of increasing concern for both law enforcement authorities and public health professionals. Different pharmaceutical opioids are misused in different regions. In North America, illicitly sourced fentanyl, mixed with heroin or other drugs, is driving the unprecedented number of overdose deaths. In Europe, the main opioid of concern remains heroin, but the non-medical use of methadone, buprenorphine and fentanyl has also been reported. In countries in West and North Africa and the Near and Middle East, the non-medical use of tramadol, a pharmaceutical opioid that is not under international control, is emerging as a substance of concern.

Non-medical use and trafficking of tramadol are becoming the main drug threat in parts of Africa

The focus of attention for global seizures of pharmaceutical opioids is now firmly on countries in West and Central Africa and North Africa, which accounted for 87 per cent of the global total in 2016. Countries in Asia, which had previously accounted for more than half of global seizures, reported just 7 per cent of the global total in 2016.

The rise in seizures of pharmaceutical opioids in Africa is mostly due to the worldwide popularity of tramadol, an opioid used to treat moderate and moderate-to-severe pain that is widely trafficked for non-medical use in the region. Tramadol is smuggled to various markets in West and Central Africa and North Africa, from where some of it is trafficked onwards to countries in the Near and Middle East. Countries in those subregions have reported the rapid expansion of the non-medical use of tramadol, in particular among some vulnerable populations. The drug is not yet under international control and is perceived by recreational users as a way of boosting energy and improving mood. However, tramadol can produce physical dependence, with WHO studies showing that this dependence may occur when it is used daily for more than a few weeks.

While some tramadol is diverted from licit channels, most of the tramadol seized worldwide in the period 2012–2016 appears to have originated in clandestine laboratories in Asia.

Non-medical use of pharmaceutical opioids reaches epidemic proportions in North America

In 2015 and 2016, for the first time in half a century, life expectancy in the United States of America

declined for two consecutive years. A key factor was the increase in unintentional injuries, which includes overdose deaths.

In 2016, 63,632 people died from a drug overdose in the United States, the highest number on record and a 21 per cent increase from the previous year. This was largely due to a rise in deaths associated with pharmaceutical opioids, including fentanyl and fentanyl analogues. This group of opioids, excluding methadone, was implicated in 19,413 deaths in the country, more than double the number in 2015. Evidence suggests that Canada is also affected, with a large number of overdose deaths involving fentanyl and its analogues in 2016.

Illicit fentanyl and its analogues are reportedly mixed into heroin and other drugs, such as cocaine and MDMA, or "ecstasy", or sold as counterfeit prescription opioids. Users are often unaware of the contents of the substance they are taking, which inevitably leads to a great number of fatal overdoses.

Outside North America, the impact of fentanyl and its analogues is relatively low. In Europe, for example, opiates such as heroin and morphine continue to predominate, although some deaths involving fentanyl analogues have started to emerge in the region. A notable exception is Estonia, where fentanyl has long been regarded as the most frequently misused opioid. The downward trend in opiate use since the late 1990s observed in Western and Central Europe appears to have come to an end in 2013. In that subregion as whole, 12 countries reported stable trends in heroin use in 2016, two reported a decline and three an increase.

A notable increase has been seen in cocaine manufacture

Global cocaine manufacture in 2016 reached its highest level ever: an estimated 1,410 tons. After falling during the period 2005–2013, global cocaine manufacture rose by 56 per cent during the period 2013–2016. The increase from 2015 to 2016 was 25 per cent.

Most of the world's cocaine comes from Colombia, which boosted its manufacture by more than one third from 2015 to 2016, to some 866 tons. The total area under coca cultivation worldwide in 2016 was 213,000 ha, almost 69 per cent of which was in Colombia.

The dramatic resurgence of coca bush cultivation in Colombia — which had almost halved from 2000 to 2013 — came about for a number of reasons related to market dynamics, the strategies of trafficking organizations and expectations in some communities of receiving compensation for replacing coca bush cultivation, as well as a reduction in alternative development interventions and in eradication. In 2006, more than 213,000 ha were eradicated. Ten years later, the figure was less than 18,000 ha.

The result has been a perceived decrease in the risk of coca cultivation and a dramatic scaling-up of manufacture. Colombia has seen massive rises in both the number of cocaine laboratories dismantled and the amount of cocaine seized.

Africa and Asia have emerged as cocaine trafficking and consumption hubs

Most indicators from North America suggest that cocaine use rose between 2013 and 2016. In 2013, there were fewer than 5,000 cocaine-related deaths in the United States, but by 2016 the figure was more than 10,000. Although many of those deaths also involved synthetic opioids and cannot be attributed exclusively to higher levels of cocaine consumption, the increase is nonetheless a strong indicator of increasing levels of harmful cocaine use.

The biggest growth in cocaine seizures in 2016 took place in Asia and Africa, reflecting the ongoing spread of cocaine trafficking and consumption to emerging markets. Although starting from a much lower level than North America, the quantity of cocaine seized in Asia tripled from 2015 to 2016; in South Asia, it increased tenfold. The quantity of cocaine seized in Africa doubled in 2016, with countries in North Africa seeing a sixfold increase and accounting for 69 per cent of all the cocaine seized in the region in 2016. This was in contrast to previous years, when cocaine tended to be seized mainly in West and Central Africa.

Cannabis remains the world's most commonly used drug

Cannabis was the most commonly used drug in 2016, with 192 million people using it at least once in the past year. The global number of cannabis users continues to rise and appears to have increased

by roughly 16 per cent in the decade ending 2016, which is in line with the increase in the world population.

The quantities of cannabis herb seized globally declined by 27 per cent, to 4,386 tons, in 2016. The decline was particularly marked in North America, where the availability of medical cannabis in many jurisdictions and the legalization of cannabis for recreational use in several states of the United States may have played a role.

Latest developments in recreational cannabis regulations

Since 2017, the non-medical use of cannabis has been allowed in eight state-level jurisdictions in the United States, in addition to the District of Columbia. Colorado was one of the first states to adopt measures to allow the non-medical use of cannabis in the United States. Cannabis use has increased significantly among the population aged 18–25 years or older in Colorado since legalization, while it has remained relatively stable among those aged 17–18 years. However, there has been a significant increase in cannabis-related emergency room visits, hospital admissions and traffic deaths, as well as instances of people driving under the influence of cannabis in the State of Colorado.

In Uruguay, up to 480 grams per person per year of cannabis can now be obtained through pharmacies, cannabis clubs or individual cultivation. Cannabis regulation in the country allows for the possession of cannabis products with a tetrahydrocannabinol content of up to 9 per cent and a minimum cannabidiol content of 3 per cent. In mid-2017, the registration of those who choose to obtain cannabis for non-medical use through pharmacies began, as did the sale of the drug through a network of 16 pharmacies.

Major markets for methamphetamine continue to grow

East and South-East Asia and North America remain the two main subregions for methamphetamine trafficking worldwide. In North America, the availability of methamphetamine was reported to have increased between 2013 and 2016, and, in 2016, the drug was reported to be the second greatest drug threat in the United States after heroin. Based on qualitative assessments, increases in consumption, manufacturing capacity and in the amounts seized point to a growing market for methamphetamine in East and South-East Asia and Oceania, where the use of crystalline methamphetamine in particular has become a key concern.

Trafficking in amphetamine expands beyond established markets

For many years, amphetamine dominated synthetic drug markets in the Near and Middle East and Western and Central Europe, but recent increases in the quantities seized in North Africa and North America point to growing activity in other subregions. While the reasons for the spike in the quantity of amphetamine seized in North Africa are not entirely clear, it may be related to the trafficking of amphetamine destined for the large market in the neighbouring subregion of the Near and Middle East.

The synthetic drug market grows in complexity and diversity

In recent years, hundreds of NPS have emerged, adding to the established synthetic drug market for ATS. Grouped by their main pharmacological effect, the largest portion of NPS reported since UNODC began monitoring are stimulants, followed by cannabinoid receptor agonists and classic hallucinogens. A total of 803 NPS were reported in the period 2009-2017. The global NPS market remains widely diversified, but except for a few substances, NPS do not seem to have established themselves on drug markets or replaced traditional drugs on a larger scale.

Use of new psychoactive substances leads to an increase in related harm

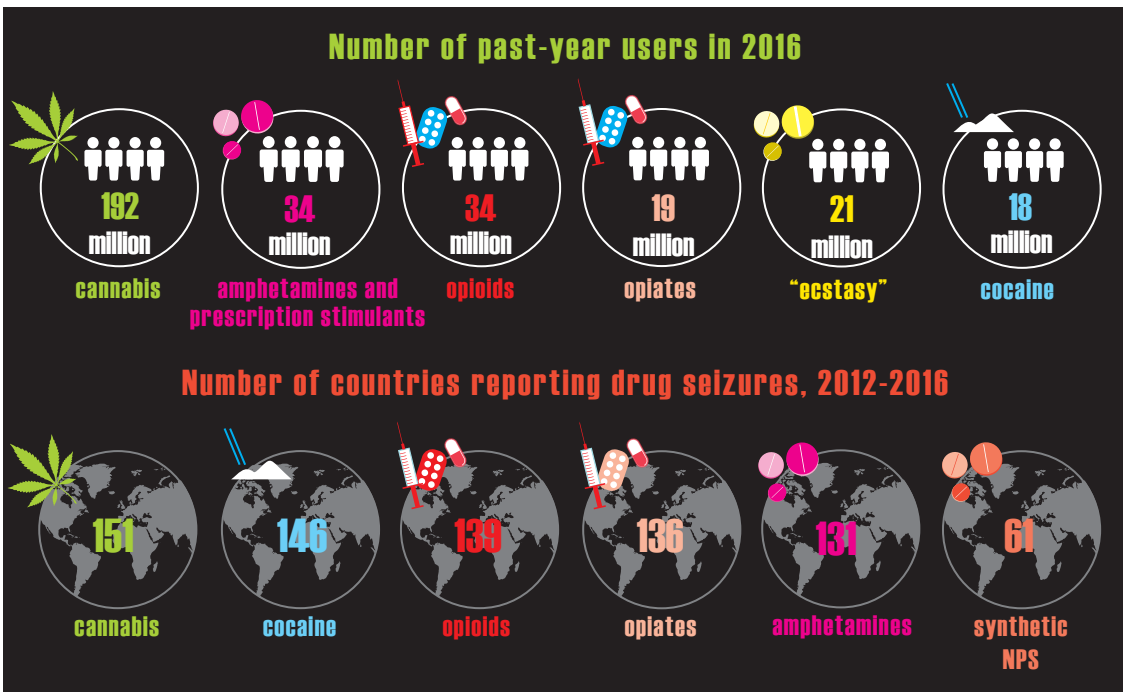
Although the overall quantity of NPS seized fell in 2016, an increasing number of countries have been reporting NPS seizures and concerns have been growing over the harm caused by the use of NPS. In several countries, an increasing number of NPS with opioid effects emerging on the market have been associated with fatalities. The injecting use of stimulant NPS also remains a concern, in particular because of reported associated high-risk injecting practices. NPS use in prison and among people on probation remains an issue of concern in some countries in Europe, North America and Oceania.

Kratom is emerging as a popular plant-based new psychoactive substance

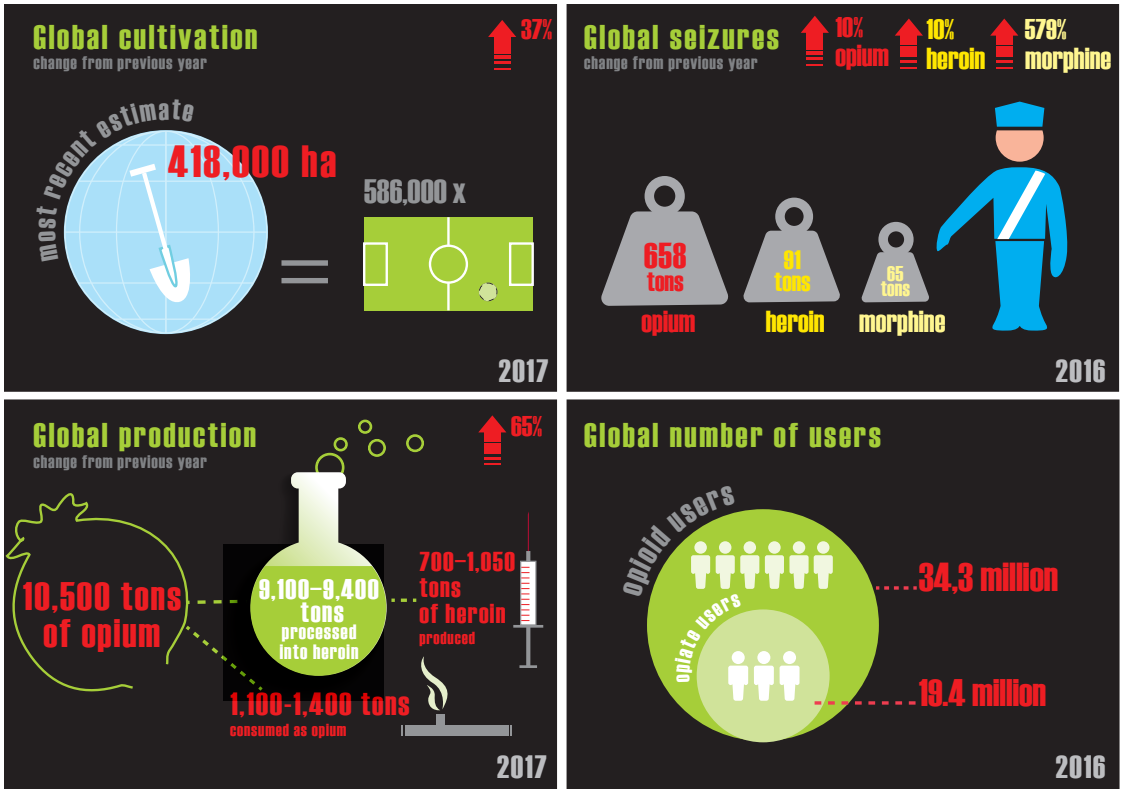
Kratom products are derived from the leaf of the kratom tree, which is used in South-East Asia as a traditional remedy for minor ailments and for non-medical purposes. Few countries have placed kratom under national legal control, making it relatively easy to buy. There are now numerous products around the world advertised as containing kratom, which usually come mixed with other substances. Some opioid users in the United States have reported using kratom products for the self-management of withdrawal symptoms. Some 500 tons of kratom were seized during 2016, triple the amount of the previous year, suggesting a boom in its popularity.

INTRODUCTION

This booklet constitutes the third chapter of the *World Drug Report 2018*. This booklet presents a global analysis of the markets for opioids, cocaine, cannabis and synthetic drugs, including ATS and NPS. The market section examines recent developments in seizures made along major trafficking routes and in destination countries, as well as significant developments in the consumption of plant-based drugs and synthetic drugs in all regions. The section on cannabis focuses on the evidence that has become available in the State of Colorado since it was among the first adopters of measures to allow non-medical use of cannabis in the United States. The section also provides a brief update on the status of implementation of the cannabis regulation in Uruguay.



A. OPIOIDS



Note: All data refer to 2016 except cultivation and production, which refer to 2017 (preliminary).

The global area under opium poppy cultivation increased by more than a third in 2017, while global opium production increased by almost two thirds

The total area under opium poppy cultivation worldwide is estimated to have increased by some 37 per cent to almost 420,000 ha from 2016 to 2017, primarily reflecting an increase in the cultivation of opium poppy in Afghanistan. With 328,000 ha under opium poppy cultivation, Afghanistan accounted for more than three quarters of the estimated global area under illicit opium poppy cultivation in 2017, a record level.

By contrast, opium poppy cultivation in Myanmar, the country with the world's second largest area under opium poppy cultivation (accounting for 10 per cent of the global estimated area in 2017), declined over the period 2015–2017 by some 25 per cent to 41,000 ha, the lowest level since 2010.

Global opium production increased by 65 per cent to 10,500 tons in 2017, the highest level since UNODC started estimating global opium production on an annual basis at the beginning of the twenty-first century.[1] The surge in global production primarily reflects an 87 per cent increase in opium production in Afghanistan to a record high of 9,000 tons, equivalent to 86 per cent of estimated global

1 Opium production estimates have existed since the proceedings of the Shanghai Opium Commission in 1909. Such estimates were, however, based on different methodologies (such as payment of taxes and other levies by opium farmers) and thus may not be fully comparable with the data presented since UNODC started estimating global opium production in 2000 (largely based on remote sensing and scientific yield surveys). The previous estimates included 16,600 tons of opium calculated for the year 1934, based on official reports by the League of Nations (UNODC, "A century of international drug control" (2009)), and 41,600 tons of opium for the period 1906/07, based on data reported by the International Opium Commission *(Report of the International Opium Commission, Shanghai, China, February 1 to February 26, 1909)*. For more details, see the online methodological annex of this report.

Record increase in opium poppy cultivation in Afghanistan: future challenges

The record level of opium poppy cultivation in Afghanistan in 2017 is likely to create multiple challenges for the country, neighbouring countries and the many other countries of transit and destination for Afghan opiates. Afghanistan is one of the least developed countries in the world, and the impact of illicit drug cultivation and production on economic, environmental and social development continues to be multifaceted. Increased levels of opium poppy cultivation, opium production and illicit trafficking of opiates will exacerbate the harmful effects of the existing large-scale production of opiates and are likely to fuel further instability and insurgency and increase funding to terrorist groups in Afghanistan. The expanding illicit economy, which in many provinces has permeated rural societies and made many communities dependent on income from opium poppy cultivation, will further constrain the development of the licit economy and potentially fuel corruption.

Moreover, the transformation of opium into heroin is likely to bring increased trafficking of precursor substances, which will potentially be diverted from licit international markets and smuggled into Afghanistan to supply manufacturers of heroin. More high-quality, low-cost heroin will reach consumer markets across the world, with increased consumption and related harms being the likely consequence. Only a small share of the revenues generated by the cultivation and trafficking of Afghan opiates reaches Afghan drug trafficking groups. Many more billions of dollars are made from trafficking opiates into major consumer markets, mainly in Europe and Asia. Addressing the opiate problem in Afghanistan is therefore a shared responsibility.

Source: UNODC and the Ministry of Counter-Narcotics of Afghanistan, *Afghanistan Opium Survey 2017: Cultivation and Production* (Vienna, 2017), p. 7.

opium production in 2017. The increase in production in Afghanistan was not only due to an increase in the area under poppy cultivation but also to improving opium yields. There is no single reason for the massive increase in opium poppy cultivation in Afghanistan in 2017 as the drivers are multiple, complex and geographically diverse, and many elements continue to influence farmers' decisions regarding opium poppy cultivation. A combination of events may have exacerbated rule-of-law challenges, such as political instability, corruption, a lack of government control and security. The shift in strategy by the Afghan Government — focusing its efforts on countering anti-government elements in densely populated areas — may have made the rural population more vulnerable to the influence of anti-government elements. A reduction in the engagement of the international aid community may also have hindered socioeconomic development opportunities in rural areas.[2]

As a result of the massive increase in opium production in 2017, opium prices fell in Afghanistan by 47 per cent from December 2016 to December 2017. However, the price of high-quality Afghan heroin decreased by just 7 per cent over the same period, which may be an indication that heroin manufacture to date has increased far less than opium production.[3]

Of the 10,500 tons of opium produced worldwide in 2017, it is estimated that some 1,100–1,400 tons remained unprocessed for consumption as opium, while the rest was processed into heroin, resulting in an estimate of between 700 and 1,050 tons of heroin manufactured worldwide (expressed at export purity), 550–900 tons of which were manufactured in Afghanistan.

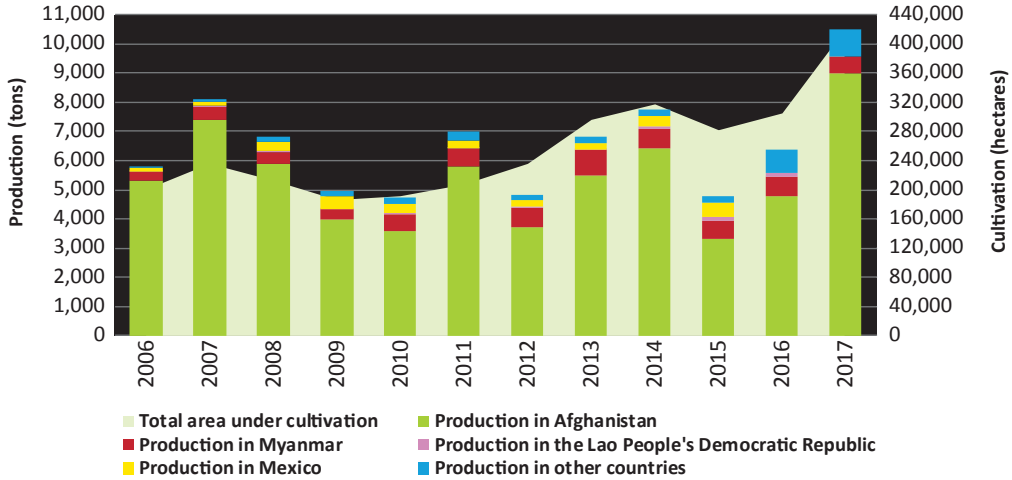
In contrast to the situation in Afghanistan, opium production in Myanmar decreased over the period 2015–2017 by some 14 per cent to an estimated 550 tons, equivalent to 5 per cent of the global opium production estimate. Despite this decline, the opium price fell by almost 30 per cent to $153 per kg in Myanmar in 2017,[4] and the quantity of opiates seized also decreased, suggesting a decrease in demand for opiates produced in Myanmar. This may be linked to the massive expansion in the supply

2 Afghanistan, Ministry of Counter-Narcotics and UNODC, *Afghanistan Opium Survey 2017* (Vienna, 2017).

3 Higher quality heroin prices were, in February 2018, still only 7 per cent lower than a year earlier. (Afghanistan, Ministry of Counter-Narcotics and UNODC, "Afghanistan drug price monitoring monthly report" (February, 2018)).

4 Also, only limited data on opium prices could be collected by the opium survey field team in Myanmar in 2017, which may potentially impact on the findings (Myanmar, Central Committee for Drug Abuse Control and UNODC, *Myanmar Opium Survey 2017*, p. 16.).

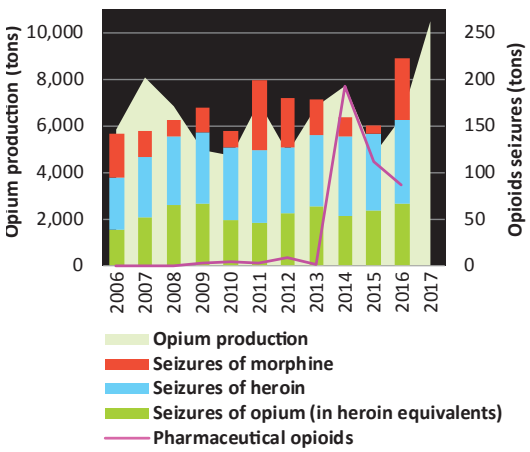
FIG. 1 | Opium poppy cultivation and production of opium, 2006–2017[a]



Source: UNODC, calculations are based on UNODC illicit crop monitoring surveys and the responses to the annual report questionnaire.
[a] *Data for 2017 are still preliminary. Mexico is not included in 2016/2017 due to the lack of data.*

of even lower priced Afghan opiates in 2017.[5] If confirmed, this would constitute a new phenomenon as there is no prior evidence of changes in Afghan opium production impacting on opium prices in South-East Asia, or vice versa, as the two markets have mainly existed in isolation from each other.

FIG. 2 | Global opium production and quantities of opioids seized, 2006–2017



Source: UNODC, responses to the annual report questionnaire; and government sources.

Note: A ratio of 10:1 was used to convert opium into heroin equivalents.

5 Myanmar, Central Committee for Drug Abuse Control and UNODC, *Myanmar Opium Survey 2017*, p. 16.

Another factor in the decline in the heroin price could be a decrease in the demand for opiates resulting from a switch to the use of ATS and other synthetic drugs in the subregion.

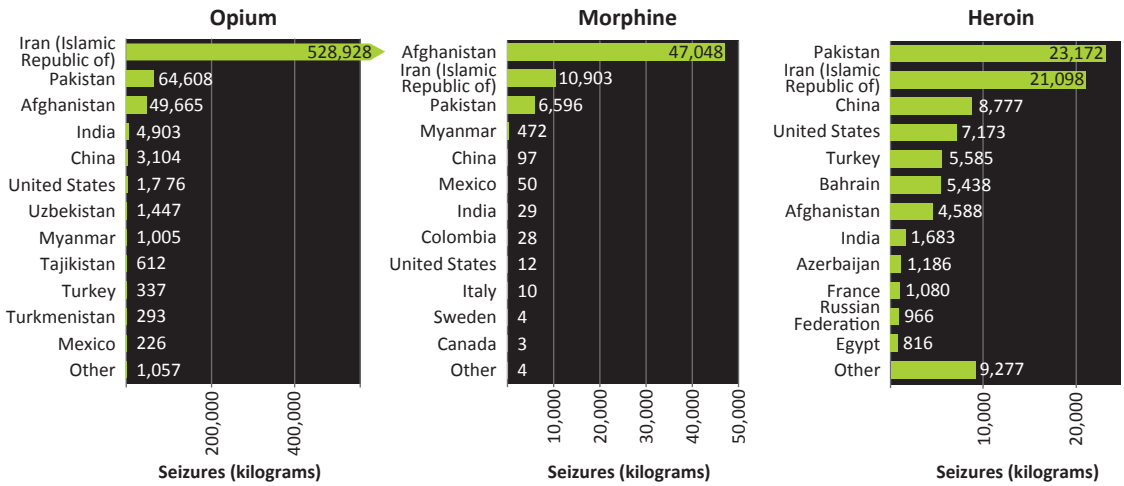
While Canada is mainly supplied with heroin from South-West Asia,[6] countries in Latin America (mostly Mexico and, to a far lesser extent, Colombia and Guatemala) account for most of the heroin supply to the United States while also supplying the still small heroin markets of South America. However, there are no opium production estimates for Mexico for the years 2016 and 2017, as the methodology for such estimates is currently under review.

Opiate seizures increased to record levels in 2016 and continue to be concentrated in Asia

The total quantity of heroin seized globally reached a record high in 2016, while the quantities of opium and morphine seized reached the second highest level ever reported. The largest quantities of opiates seized were of opium (658 tons), followed by seizures of heroin (91 tons) and morphine (65 tons). Overall seizures of opiates, expressed in heroin equivalents, increased by almost 50 per cent from 2015 to 2016, of which the quantity of heroin seized exceeded that of opium and morphine.

6 UNODC, responses to the annual report questionnaire.

FIG. 3 | Countries reporting largest quantities of opiates seized, 2016

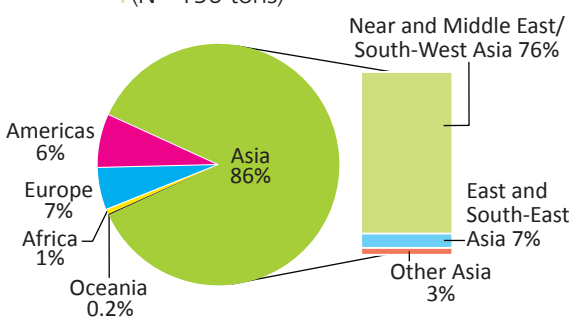


Source: UNODC, responses to the annual report questionnaire; and government sources.

As most seizures of opiates are made in, or close to, the main opium production areas, Asia, which is responsible for more than 90 per cent of global illicit opium production, accounted for 86 per cent of the total quantity of heroin and morphine seized in 2016. This is primarily a reflection of the increasing concentration of opium production in Afghanistan and the consequent increase in seizures by neighbouring countries.

Similarly to the distribution of heroin and morphine seizures, overall, 90 per cent of the total quantity of opiates (including opium), expressed in heroin equivalent, was seized in Asia, the vast majority in the Near and Middle East/South-West Asia (83 per cent), while 6 per cent was seized in East and South-East Asia.

FIG. 4 | Distribution of global quantities of heroin and morphine seized in 2016 (N= 156 tons)



Source: UNODC, responses to the annual report questionnaire; and government sources.

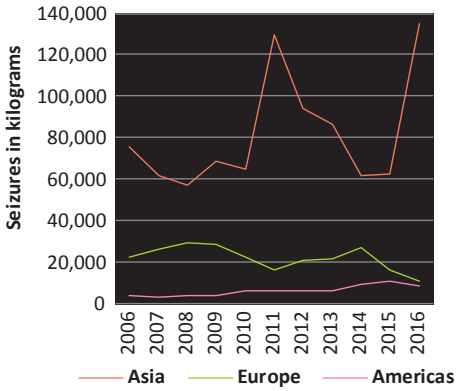
Quantities of heroin and morphine seized are on the increase in South-West Asia but on the decrease in South-East Asia, Europe and the Americas

The quantity of heroin and morphine intercepted in Asia more than doubled from 2015 to 2016 to reach 135 tons. This reflected increases in the Near and Middle East/South-West Asia of more than 150 per cent (mostly in countries neighbouring Afghanistan), a consequence of marked increases in Afghan opiate production. By contrast, the quantities of heroin and morphine seized in East and South-East Asia decreased by 6 per cent in that period, which can be linked to the decline in opiate production in Myanmar and thriving ATS trafficking in the subregion.

In Europe, the quantity of heroin and morphine seized fell by 32 per cent, to 11 tons, from 2015 to 2016, the smallest quantity seized since 1997, reflecting a decrease of 11 per cent in West and Central Europe, a decrease of 31 per cent in South-Eastern Europe, and a decrease of 67 per cent in Eastern Europe.

In 2016, the quantity of heroin and morphine seized in the Americas decreased, for the first time in years, by 22 per cent, mostly in North America (-25 per cent). Nevertheless, almost 90 per cent of all heroin

FIG. 5 Quantities of heroin and morphine seized, in kilograms, for selected regions, 2006–2016



Source: UNODC, responses to the annual report questionnaire; and other government sources.

and morphine intercepted in the Americas was seized in North America, which is home to both the main heroin manufacturing country in the Americas (Mexico) and the main consumption country (United States). The decline in the quantity of heroin seized in North America has taken place in the context of the rapidly growing market for synthetic opioids, such as fentanyl and its analogues smuggled into the United States, as reflected in the doubling of the quantity of "pharmaceutical opioids" seized in North America in 2016. Overall, 25 per cent of fentanyl seizures in the United States also contained heroin in 2016 and were often sold as heroin.[7]

The quantity of heroin seized in Africa increased by 46 per cent from 2015 to 2016, but was still 85 per cent lower than at its peak in 2014.

The Balkan route continues to dominate the trafficking of opiates originating in Afghanistan

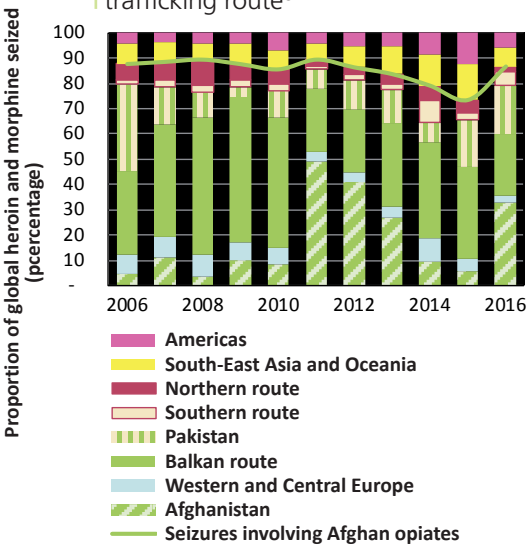
The world's principal heroin trafficking route continues to be the so-called Balkan route, along which opiates are trafficked from Afghanistan to the Islamic Republic of Iran, Turkey, the Balkan countries and then on to various destinations in West and Central Europe. Excluding seizures made in Afghanistan, countries along the Balkan route accounted for 37 per cent of the total quantity of heroin and morphine seized worldwide in 2016, with a further 4 per cent seized by countries in Western and Central Europe. Most of the heroin and morphine seized on the Balkan route was seized in the Islamic Republic of Iran (32.0 tons), while smaller quantities were seized in Turkey (5.6 tons), the Balkan countries (0.8 tons) and the countries of Western and Central Europe (3.9 tons). Opiates are trafficked either along the eastern branch of the Balkan route from Turkey to Bulgaria and then onwards to Romania and Hungary, or along the western branch of the Balkan route from Bulgaria to various western Balkan countries, and from there to countries in Western and Central Europe.

The analysis of all countries of origin, departure and transit of seized heroin and morphine reported by West and Central European countries in the annual report questionnaire over the period 2012–2016 revealed that 80 per cent of all heroin-related mentions were linked to countries along the Balkan route. A further 6 per cent were linked to Pakistan. While some heroin is trafficked directly from Pakistan by air or sea to Europe, large opiate shipments are also trafficked from Pakistan to the Islamic Republic of Iran for onward trafficking along the Balkan route. The Islamic Republic of Iran reported that 80 per cent of the morphine and 85 per cent of the heroin it seized in 2016 had been trafficked into the country via Pakistan, with the rest being smuggled directly from Afghanistan. It should be highlighted, though, that significant amounts of Afghan opiates remain in the region for local consumption.

Much smaller amounts of heroin are trafficked along a sub-branch of the Balkan route that goes from the Islamic Republic of Iran to the countries of the southern Caucasus (mainly Azerbaijan and Georgia) for shipment across the Black Sea to Ukraine and then by land, partly through the Republic of Moldova, to Romania for onward trafficking along the eastern branch of the Balkan route to Western Europe. According to seizure data, opiate trafficking along this sub-branch of the Balkan route increased considerably for several years, with seizures of heroin and morphine rising from 121 kg in 2006 to 1.3 tons in 2016. However, 2016 seizure data for this route indicate diverging trends: heroin and morphine seizures increased sharply in Azerbaijan and

7 United States, Department of Justice, Drug Enforcement Administration, *2017 National Drug Threat Assessment* (October 2017).

FIG. 6 Percentage distribution of quantities of heroin and morphine seized, by main trafficking route[a]



Source : UNODC, responses to the annual report questionnaire.

[a] *Balkan route: the Islamic Republic of Iran—South-Eastern Europe—Western and Central Europe; the southern route: South Asia—Gulf countries and other countries in the Near and Middle East—Africa; northern route: Central Asia and Transcaucasia—Eastern Europe.*

Georgia in 2016 but declined sharply in Ukraine and Romania, which could be an indication of a greater opiate supply through the countries of the Caucasus that goes undetected, or it could be an indication that increased law enforcement operations in the countries of the Caucasus have prevented much of the onward trafficking to Ukraine and Romania. Most of the heroin seized in Romania in 2016 had transited Turkey and Bulgaria, in contrast to the situation reported in 2015, when most heroin transited Ukraine.

Quantities of heroin trafficked directly to Western and Central Europe via the southern route may be on the decrease

Some Afghan opiates are trafficked to Europe through the so-called southern route, which goes from Afghanistan to Pakistan (and partly to the Islamic Republic of Iran) for subsequent shipment to the Gulf countries and East Africa and onward trafficking to Europe, either directly by air or via Southern or West Africa by air or sea. Alternatively, drugs are trafficked along the southern route to India and other countries in South Asia for subsequent shipment to Europe or North America (mostly Canada). Overall, 9 per cent of mentions of countries of origin, departure and transit of opiate seizures by reporting European countries were linked to opiate trafficking along the southern route over the period 2012–2016. In 2016, two European countries reported trafficking of heroin via the southern route: Belgium (10 kg, via Kenya) and Italy (65 kg, via the United Arab Emirates and via Qatar).

Heroin supply to the Russian Federation continues to transit Central Asia and Transcaucasia

Trafficking to the Russian Federation is carried out predominantly along the northern route via the countries of Central Asia, or via the countries of the Caucasus, to destination markets in the Russian Federation and, to a very small extent, for trafficking onwards to Belarus and Lithuania.[8] In 2016, the main transit countries for heroin seized in the Russian Federation continued to be countries in Central Asia and Transcaucasia (notably Tajikistan, Kazakhstan and Azerbaijan), while Pakistan, which had been mentioned as a transit country in 2015, was no longer a major country of transit.

Despite indications of a decrease in heroin trafficking in East and South-East Asia, the subregion remains the main source of heroin to Oceania

Opiates produced in South-East Asia (mostly Myanmar) are trafficked to other markets in that subregion (mostly China and Thailand) and to Oceania (mostly Australia). Seizures made in those countries decreased by 15 per cent in 2016. In Australia, nearly all heroin quantities intercepted at the border in 2015 originated in South-East Asia (98 per cent over the period January–June 2015), but trafficking of heroin may be declining as suggested by seizures at the border which, in terms of both quantities and cases, decreased from 2014/15 to 2015/16.[9]

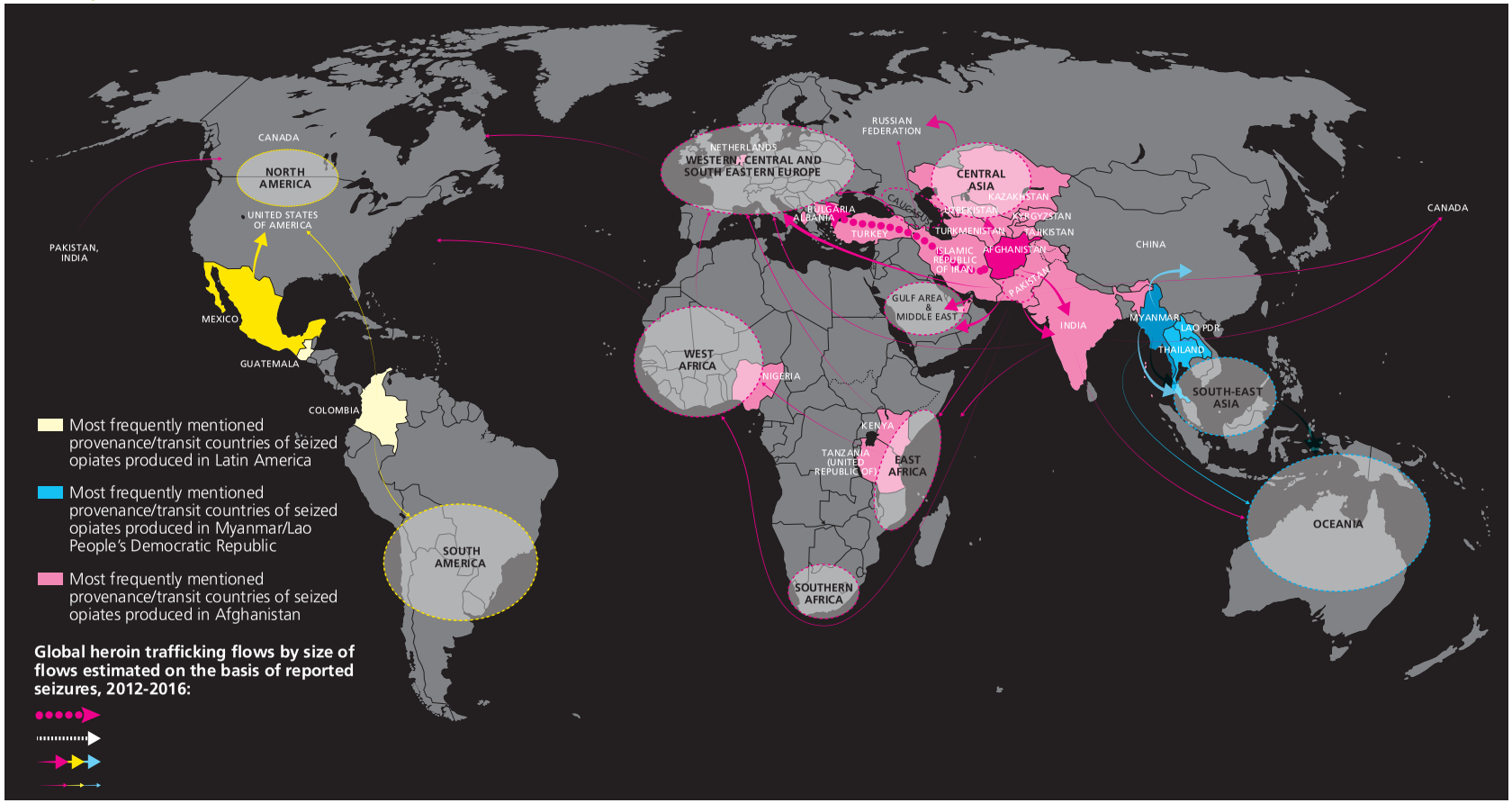
Heroin trafficking in the Americas is on the decrease, while the trafficking of synthetic opioids is on the increase

Most heroin (and morphine) trafficked in the Americas is smuggled from Mexico to the United States,

8 UNODC, annual report questionnaire data.

9 Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2015-16* (Canberra, 2017).

MAP 1 | Main heroin trafficking flows, 2012–2016



Sources: UNODC, responses to the annual report questionnaire and individual drug seizure database.

Notes: The size of the trafficking flow lines is based on the amount of heroin seized in a subregion and the number of mentions of countries from where the heroin has departed (including reports of "origin" and "transit") to a specific subregion over the period 2012–2016. A darker shade indicates that the country represents more than 50 per cent of heroin production in the region. The trafficking flows are determined on the basis of country of origin/departure, transit and destination of seized drugs as reported by Member States in the annual report questionnaire and individual drug seizure database: as such, they need to be considered as broadly indicative of existing trafficking routes while several secondary flows may not be reflected. Flow arrows represent the direction of trafficking: origins of the arrows indicate either the area of manufacture or the one of last provenance, end points of arrows indicate either the area of consumption or the one of next destination of trafficking.

The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations. Dashed lines represent undetermined boundaries. The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. The final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

with far smaller quantities smuggled from Colombia and Guatemala. Analysis of heroin samples in the United States over the past decade shows the increasing predominance of Mexico (90 per cent of samples analysed in 2015) as a source country of the drug, while the importance of countries in South America (3 per cent) has declined markedly. South-West Asia accounted for around 1 per cent of the samples analysed in 2015.[10]

Based on quantities seized, heroin trafficking in the Americas, particularly trafficking to North America, showed a clear upward trend until 2015, ending with a marked decline in 2016. This seems to have gone in parallel with an expansion in the trafficking of synthetic opioids in the region, as some organized crime groups from Mexico and, to a lesser extent, from the Dominican Republic that are involved in heroin trafficking expanded their activities to the trafficking of synthetic opioids, notably fentanyl.[11]

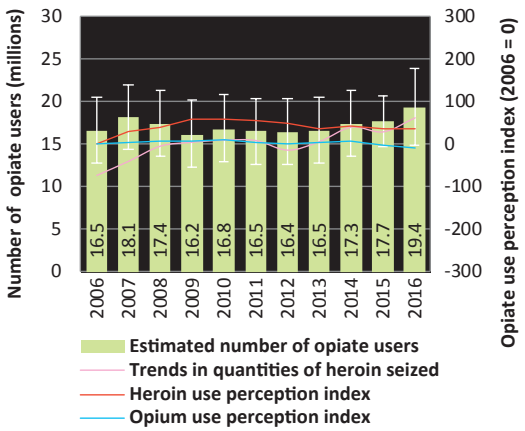
The global opiate market is on the increase again

The latest data on the number of annual opiate users suggest that there has been an expansion of the global opiate market, with 19.4 million users in 2016, or 0.4 per cent of the population aged 15–64 years. More than half of the estimated number of annual opiate users reside in Asia (58 per cent), almost one fifth in Europe (17 per cent), and one seventh in the Americas (15 per cent). The highest opiate prevalence rates were reported in the Near and Middle East/South-West Asia (1.6 per cent), North America (0.8 per cent) and Europe (0.6 per cent). While both quantities of heroin seized and the prevalence of opiate use are on the increase at global level, the heroin use perception index, based on assessments by national experts, has remained relatively unchanged in the past few years.

Signs of increases in the opiate market in West and Central Europe

The downward trend in opiate use since the late 1990s observed in Western and Central Europe appears to have come to an end in 2013. Since then

FIG. 7 Estimated number of opiate users, trends in quantities of heroin seized and heroin and opium use perception indexes (2006=100)



Source: UNODC, elaboration based on annual report questionnaire data.

the prevalence of opiate use has been increasing, with the increase being particularly marked in 2016. The 2016 increase was primarily the result of higher opiate use estimates reported by Poland, reflecting not only rising prevalence rates for heroin use (from 0.1 per cent of the population aged 15-64 in 2014 to 1.1 per cent in 2016) but also high levels of "kompot" use (1.7 per cent).[12] Also known as "Polish heroin", "kompot" is a liquid preparation made from poppy straw, which is intended for injecting. In West and Central Europe as a whole, 12 countries reported stable trends in heroin use in 2016, two reported a decline and three an increase (up from one in 2015).

In parallel, there have been reports of rising drug-related deaths in various European countries in recent years, often linked to the use of opiates, although the ageing of drug-using cohorts may also have played a role. In England and Wales, for example, opioid-related deaths rose by more than 58 per cent over the period 2012–2016 to 2,593 cases, with heroin- and morphine-related deaths doubling over that period.[13] In Germany, where opiates are respon-

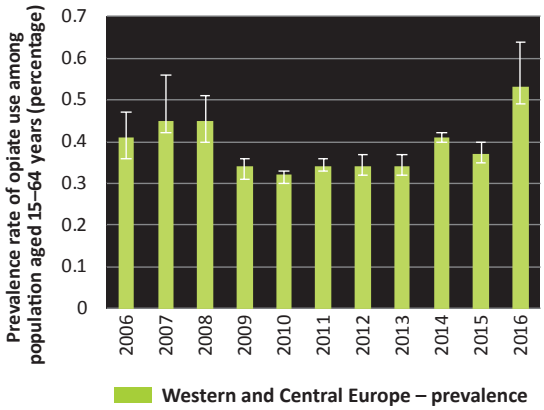
10 United States, Department of Justice, Drug Enforcement Administration, *2017 National Drug Threat Assessment* (October 2017), p. 48.

11 Drug Enforcement Administration, 2017 National Drug Threat Assessment.

12 UNODC, data from replies to UNODC annual report questionnaire.

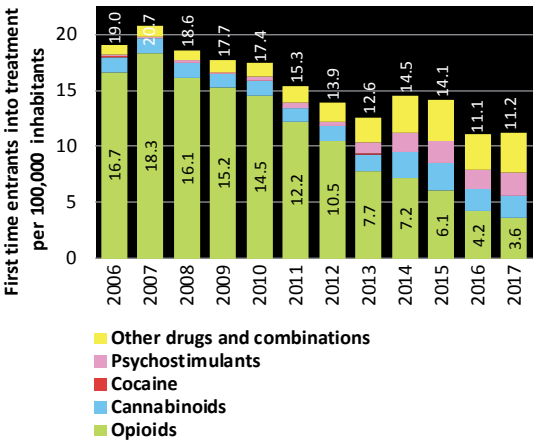
13 United Kingdom of Great Britain and Northern Ireland, Office for National Statistics, "Deaths related to drug poisoning in England and Wales: 2016 registrations", Statistical Bulletin (Newport, 2 August 2017).

FIG. 8 Prevalence of opiate use in Western and Central Europe, 2006–2016



Source: UNODC, elaboration based on annual report questionnaire data.

FIG. 9 First time entrants into drug-related treatment per 100,000 inhabitants in the Russian Federation, by drug type, 2006–2017*



Source: "Basic Functioning Indicators of the Narcological Service of the Russian Federation". Set of statistical handbooks for 2008–2017, released by NRC on Addictions – branch of V.Serbsky NMRCPN.

**Data for 2017 are still preliminary.*

sible for the bulk of all drug-related deaths, the number rose from 944 deaths in 2012 to 1,333 deaths in 2016.[14]

By contrast, heroin seizures have not increased in Western and Central Europe in recent years and actually decreased in 2016. The conflicting trends between demand indicators and seizures could be the result of different dynamics; for example, an increased supply of high-purity opiates (explained by larger production in Afghanistan) could go undetected yet drive a rise in demand and related health consequences.

The opiate market in Eastern Europe continues to shrink

In Eastern Europe, the heroin perception use index remained largely stable from 2006 to 2016, while heroin seizures have been declining along the northern route, the main trafficking route from Afghanistan to Eastern Europe, suggesting a shrinking of the opiate market in the subregion.

In the Russian Federation, the most important opiate market in Eastern Europe, the drug market has started to change, and other drugs, particularly synthetic drugs, have started to dominate. The number of first time entrants into treatment for opioid use (mostly heroin use) declined by more than three quarters over the period 2006–2017, with a reduction in the proportion of drug treatment for opioids over time. Drug-related deaths in the Russian Federation, which are mostly linked to the use of opioids, fell from 9,354 cases in 2006 to 5,249 cases in 2016, the lowest level in a decade.[15]

Mixed signals from the opiate market in North America

In the Americas, expert perceptions suggest an increase in heroin use in recent years. The largest heroin market in the Americas is the United States, accounting for almost 80 per cent of all opiate users in the region and 86 per cent of all opiate users in North America. National household surveys and heroin-related deaths suggest that heroin use has been increasing for some time in the United States. While the estimated number of heroin users rose by 14 per cent in 2016 (from the previous year), the annual prevalence rate of heroin use doubled between 2010 and 2016. The increase in heroin-related deaths was primarily linked to heroin being combined with fentanyl.[16]

14 Germany, Bundeskriminalamt, *Rauschgiftkriminalität: Bundeslagebild 2016* (and editions of the previous years).

15 "Basic Functioning Indicators of the Narcological Service of the Russian Federation". Set of statistical handbooks for 2008-2017,released by NRC on Addictions – branch of V.Serbsky NMRCPN.

16 Centers for Disease Control and Prevention, Heroin overdose data, 2018. Available at www.cdc.gov/drugoverdose/data/heroin.html.

On the other hand, workforce testing results showed a small decrease in heroin use in 2016, from 0.28 per cent in 2015 to 0.25 per cent of the federally mandated workforce and the general workforce of the United States that were tested.[17] The annual prevalence of heroin use among young adults remained relatively stable in 2016 (0.4 per cent in 2016 compared with 0.5 per cent in 2015),[18] while the annual prevalence of heroin use among eighth, tenth and twelfth grade students in the United States continued to decrease in 2016 (from 0.8 per cent in 2010 to 0.3 per cent in 2016) and remained at the lower level in 2017.[19]

Heroin use appears to be on the increase in Africa

Information on the prevalence of opiate use in Africa and in Asia is still very limited, making it difficult to identify solid trends. Based on expert perceptions reported to UNODC, heroin use in Africa appears to have increased more than in other regions over the period 2006–2016, likely reflecting the increasing "spillover" effect of heroin trafficking from South-West Asia along the southern route. Increases in the use of heroin in East Africa were reported in 2015 by Kenya and the United Republic of Tanzania and in 2016 by Madagascar; in southern Africa by Mozambique in 2015; and in West and Central Africa by Côte d'Ivoire in 2016. In 2016, several large African countries reported a stabilization in heroin use — notably all of the North African countries, Nigeria in West and Central Africa, South Africa and Zambia in Southern Africa, and Kenya in East Africa. In the rest of Africa, expert perceptions point to a decline in heroin use in the region following several years of ongoing increases.

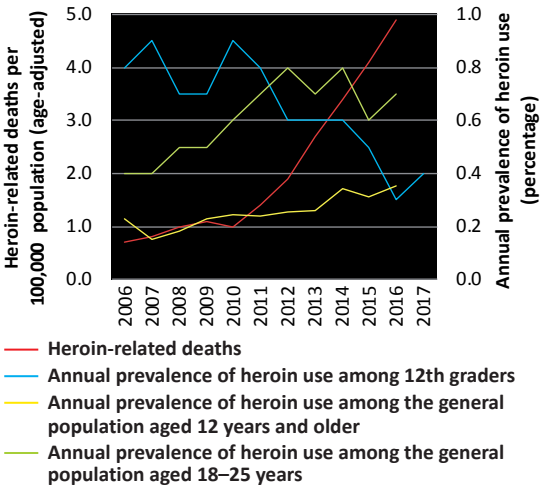
In Asia, data on expert perceptions suggest a decline in heroin use since 2011, particularly since 2014.

17 This is based on some 9 million drug tests made of workers of the federally mandated workforce and the general workforce in the United States in 2015 and 2016 (Quest Diagnostics Drug Testing Index, full year 2016 tables (May, 2017) and results of the previous year).

18 John Schulenberg and others, Monitoring the Future National Survey Results on Drug Use, 1975-2016: 2016—College Students and Adults Ages 19-55, vol. 2 (Ann Arbor, Michigan, University of Michigan, 2017), p. 49.

19 National Institute of Drug Abuse, Monitoring the Future survey, 2017 data from in-school surveys of 8th, 10th and 12th grade students.

FIG. 10 Heroin prevalence rate in student and household surveys, and heroin-related deaths in the United States, 2006–2016



Source: United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Results from the 2016 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, September 2017); and Centers for Disease Control and Prevention, Multiple cause of death database, December 2016; and "Drug overdose deaths in the United States, 1999–2016", *NCHS Data Brief* (December 2017).

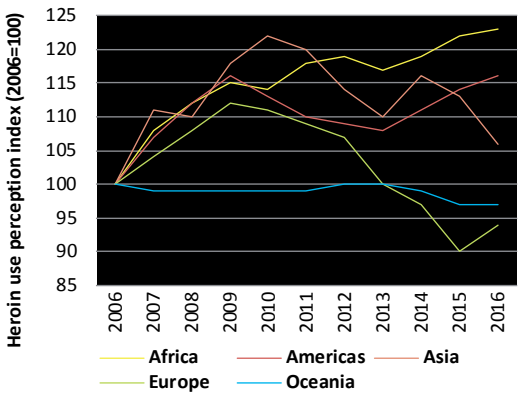
Declines in heroin use in 2016 were mainly reported in countries in East and South-East Asia, notably China (Hong Kong Special Administrative Region), Indonesia, the Republic of Korea and Thailand. By contrast, several countries in the Near and Middle East/South-West Asia reported increases in 2016, notably Iran (Islamic Republic of), Iraq, Qatar and the United Arab Emirates (and, in 2015, Pakistan). These increases could be linked to increasing levels of heroin trafficking from Afghanistan to those countries. However, other countries, including Israel, Jordan and Saudi Arabia, where stimulants play a larger role, saw heroin use stabilize.

Most countries in Central Asia do not yet seem to have been affected by the increase in Afghan heroin manufacture; experts perceived declines in heroin use in 2016 in Uzbekistan, Kyrgzystan and Kazakhstan. This is in line with reports of decreasing quantities of heroin seized along the northern route in Central Asia in recent years.

Heroin use in Oceania remains limited

In Oceania, expert perceptions suggest a slight decline in heroin use in the past five years. Annual

FIG. 11 Trends in heroin use perception index, by region (2006 = 100)



Source: UNODC, responses to the annual report questionnaire.

prevalence data for Australia, which accounts for the majority of heroin users in Oceania, showed a decline in heroin use from a peak of 0.8 per cent of the population aged 14 years and older in 1998 to 0.2 per cent in 2001 and 0.1 per cent in 2013, before increasing to 0.2 per cent in 2016.[20] This pattern is confirmed by a number of other indicators that showed a massive decline in heroin supply and use in 2001 and no significant recovery thereafter.[21] Wastewater analysis in 2017 confirmed low levels of overall heroin consumption in Australia, possibly a consequence of comparatively very high heroin prices (AUD 335[22] or $263 per gram in 2017).

Elsewhere in the region, heroin use in New Zealand was reported to be low and stable, with opioid prevalence being lower, as in most other countries, than the prevalence of use of cannabis, ATS and synthetic cannabinoids. Among the various opioids, the prevalence of heroin use in New Zealand ranked third after pharmaceutical opioids and after opium.

20 Australian Institute of Health and Welfare, *National Drug Strategy Household Survey 2016* (Canberra, 2017).

21 Australian Institute of Criminology, "Australian heroin drought affects heroin market", Crime Facts Info, No. 12 (20 November, 2001); Louisa Egenhardt, Carolyn Day and Wayne Hall, The Causes, Course and Consequences of the Heroin Shortage in Australia, Monograph Series, No. 3 (Sydney, University of New South Wales, National Drug and Alcohol Research Centre, 2004); Louisa Degenhardt and others, "Evaluating explanations of the Australian 'heroin shortage'", Addiction, vol. 100 (2005), pp. 459–469; Anne Dray and others, "Policing Australia's 'heroin drought': using an agent-based model to simulate alternative outcomes", Journal of Experimental Criminology, vol. 4, No. 3 (2008), pp. 267–287.

22 A. Karlsson and L. Burns, *Australian Drug Trends 2017: Findings from the Illicit Drug Reporting System (IDRS)*, Australian Drug Trend Series, No. 181 (Sydney, University of New South Wales, National Drug and Alcohol Research Centre, 2018), p. 39.

The market for non-medical use of pharmaceutical opioids is expanding

Despite the paucity of data in many subregions, the trafficking of and the non-medical use of pharmaceutical opioids seem to be of increasing concern for both law enforcement agencies and public health professionals in many countries, although the extent and type of pharmaceutical opioids used for non-medical purposes may differ. In North America, for example, hydrocodone, oxycodone, codeine and tramadol are the main pharmaceutical opioids that are used for non-medical purposes, while methadone, buprenorphine and fentanyl are the main pharmaceutical opioids misused (based on drug treatment services data)[23] reported in Europe. In countries in West Africa, North Africa and the Near and Middle East, tramadol is the main substance used by people reporting non-medical use of pharmaceutical opioids.

Seizures of pharmaceutical opioids have reached similar levels to those of heroin

In 2016, the global quantity of pharmaceutical opioids seized was 87 tons, roughly the same as the quantity of heroin seized that year. The largest quantities of pharmaceutical opioids seized in 2016 were, once again, of tramadol (68 tons), followed by codeine (18 tons), oxycodone (1 ton) and fentanyl (0.4 tons). The quantities of pharmaceutical opioids seized, other than tramadol, methadone and hydromorphone, increased in 2016. The increases were particularly pronounced in the case of codeine and oxycodone, which rose more than thirtyfold from the previous year, as well as in the case of fentanyl and its analogues (carfentanyl, a tenfold increase; and fentanyl, a fourfold increase) and of buprenorphine (a sevenfold increase).

Africa continues to dominate global seizures of pharmaceutical opioids

In 2016, the largest quantities of pharmaceutical opioids were seized, for the second year in a row, by

23 EMCDDA, *European Drug Report 2017: Trends and Developments.*

African countries (mostly in West and Central Africa, and North Africa), accounting for 87 per cent of the global total. Asia accounted for just 7 per cent of the global total of pharmaceutical opioids seized in 2016 (mostly East and South-East Asia).

The pharmaceutical opioids seized in Africa consisted mainly of tramadol, followed by codeine. In Asia, seizures of pharmaceutical opioids were dominated by codeine, followed by tramadol, while in Europe they were dominated by tramadol, followed by methadone and codeine. Large tramadol seizures in Europe were made in Malta and Greece, of tramadol that originated in India and was destined for markets in North Africa. Seizures of pharmaceutical opioids in the Americas were dominated by oxycodone, followed by codeine and fentanyl.

Comparisons of seizures of pharmaceutical opioids by weight can mask the fact that very different numbers of doses can be obtained from 1 gram of different opioids. Expressed in terms of doses seized, rather than of weight seized, seizures of pharmaceutical opioids in the Americas were clearly dominated by fentanyl and its analogues in 2016, followed by oxycodone. Even at the global level, calculations based on doses recommended for medical use[24] by first-time users suffering from pain suggest that most doses of pharmaceutical opioids seized in 2016 were of fentanyl, followed by codeine.[25]

Fentanyl and its analogues remain a major concern in the United States

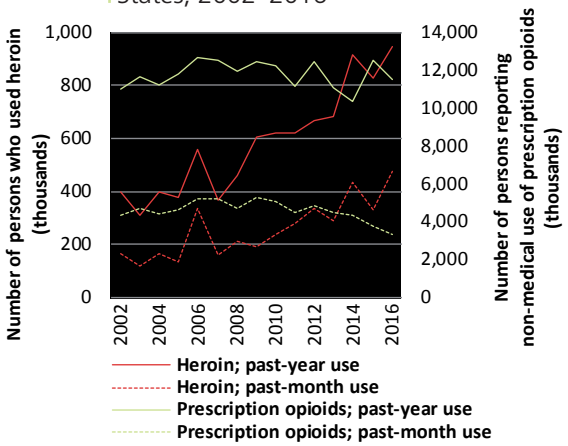
In the United States in 2016, nearly 4 per cent of the population aged 12 years and older reported non-medical past-year use of prescription opioids,[26] which was most prevalent among those aged 18–25 years. Compared with heroin use, which has been increasing each year since 2007, the non-medical use of prescription opioids has shown a stable trend

24 The British National Formulary recommends doses of 50 mg of tramadol, 30 mg of oxycodone, 5 mg of codeine or 0.1 mg of fentanyl to patients suffering from pain who had not taken pain medication before. (British National Formulary, vol. 74 (September 2017-March 2018)).

25 Detailed calculations are provided in the online methodological annex.

26 United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Results from the 2016 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, September 2017).

FIG. 12 Trends in the use of heroin and prescription opioids in the United States, 2002–2016



Source: United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Results from the 2016 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, September 2017).

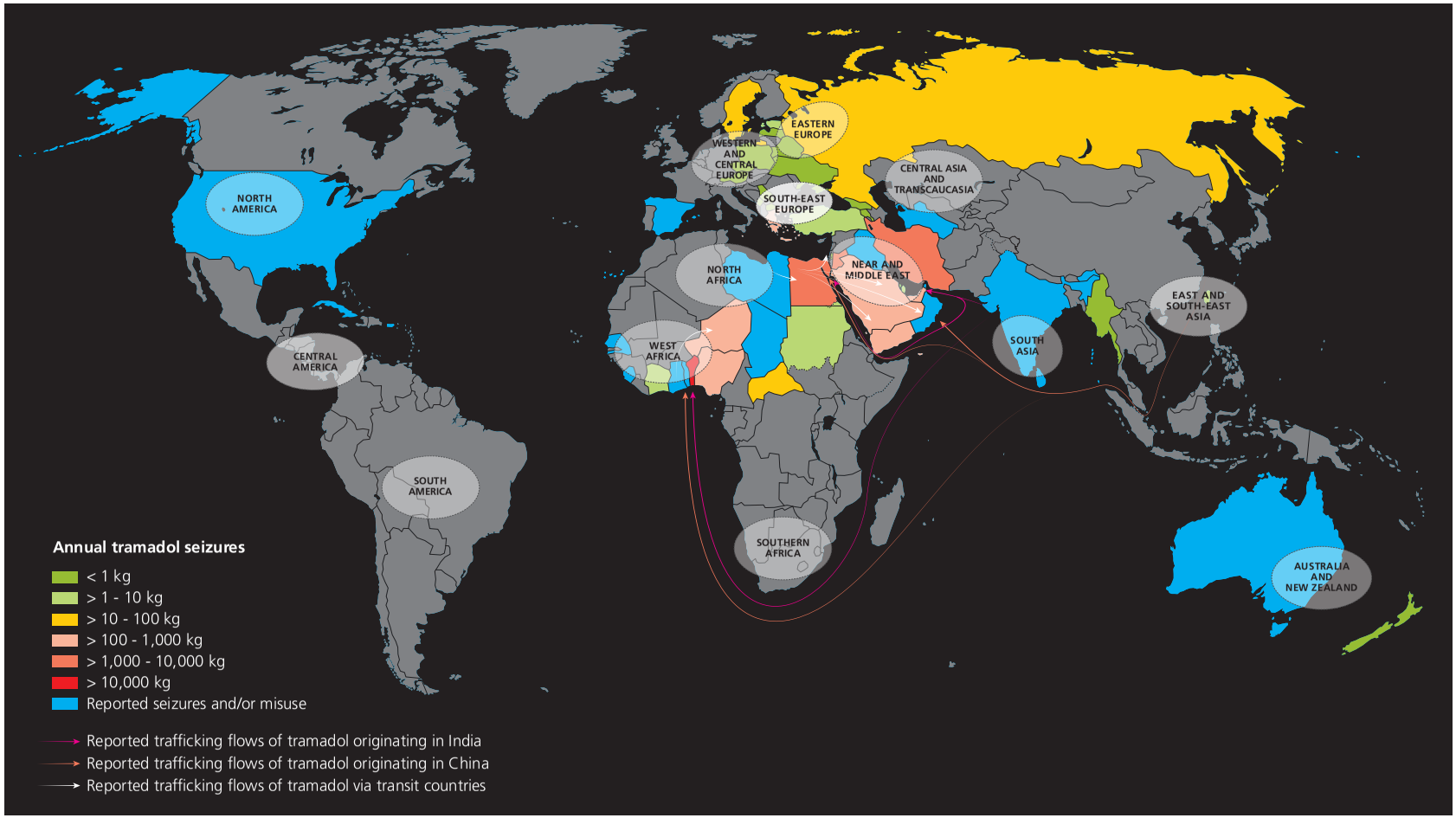
in the past five years. The most commonly misused prescription opioids reported in the National Survey on Drug Use and Health in 2016 in the United States are hydrocodone, oxycodone, codeine and tramadol. While the non-medical use of fentanyl self-reported in that survey is minimal (0.1 per cent of the population aged 12 years and older), illicit fentanyl and its analogues are increasingly found in the analysis of drug samples, including of heroin.[27] Illicit fentanyl is reportedly mixed into heroin as well as other illicit drugs such as "ecstasy", or sold as counterfeit prescriptions opioids. Since users are often unaware of the contents of the substance or tablet they are taking, this can lead to fatal overdose incidents.[28]

There were almost 64,000 overdose deaths in the United States in 2016, with opioid overdose deaths accounting for over 70 per cent of the total. While all opioid related deaths have increased in the United States, the most worrying trend is the number of overdose deaths related to synthetic opioids, which doubled in the past year. Synthetic opioids include fentanyl, fentanyl analogues and tramadol.

27 United States Department of Justice, Drug Enforcement Administration, "Emerging threat report: fourth quarter 2017".

28 Drug Enforcement Administration, 2017 National Drug Threat Assessment.

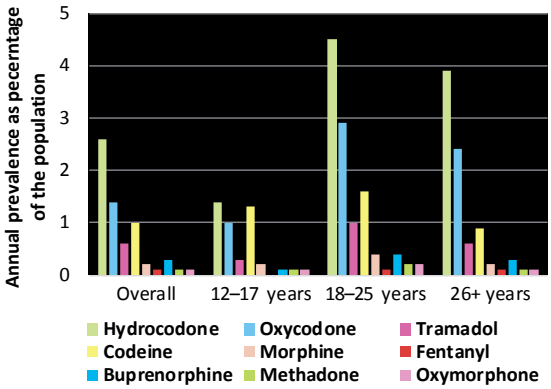
MAP 2 | Reported tramadol seizures (and/or misuse) and major tramadol trafficking/diversion flows, 2012–2016



Source: UNODC, annual report questionnaire data, *Report of the International Narcotics Control Board for 2016* (and previous years); report of Heads of National Law Enforcement Agencies for 2016 (and previous years); *WHO Expert Committee on Drug Dependence: Thirty-sixth Report*, WHO Technical Report Series, No. 902 (Geneva, World Health Organization, 2002); United States Department of State, Bureau for International Narcotics and Law Enforcement Affairs, *International Narcotics Control Strategy Report* (2017) (and previous years).

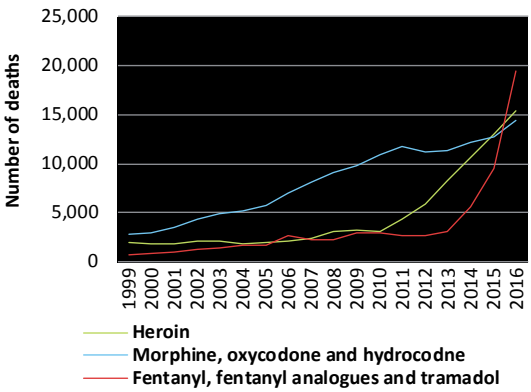
Notes: The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations. Dashed lines represent undetermined boundaries. The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. The final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

FIG. 13 Non-medical past-year use of different prescription opioids in the United States, by age group, 2016



Source: United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Results from the 2016 National Survey on Drug Use and Health: Detailed Tables* (Rockville Maryland, September 2017).

FIG. 14 Opioid overdose deaths in the United States



Source: United States, Centers for Disease Control and Prevention, National Center on Health Statistics, CDC WONDER, 2017.

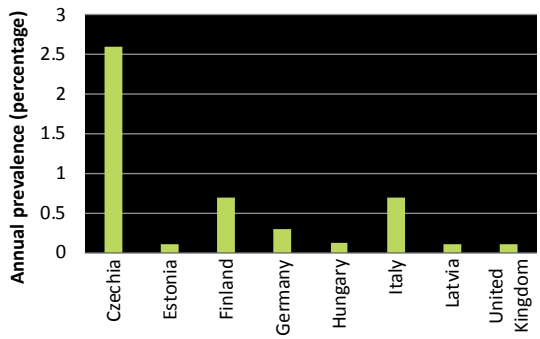
Signs of use of pharmaceutical opioids emerging in Western and Central Europe

In Western and Central Europe, the non-medical use of pharmaceutical opioids is not at the same level as that reported in North America, but the emergence of new synthetic opioids (mostly fentanyl and its derivatives) is of concern in the subregion.[29] Although few countries in Western and Central Europe report the non-medical use of pharmaceutical opioids in their national drug use surveys, in the countries that do so, such use ranges between 2.6 per cent of the adult population (Czechia) and 0.1 per cent (Latvia, Estonia and the United Kingdom).

Since 2009, 25 new opioids (mostly fentanyl and its analogues) have been reported in the subregion. Although new opioids currently represent only a fraction of the opioid market in Western and Central Europe, the new fentanyl analogues are highly potent substances that pose a serious threat to individual and public health. Illicit fentanyl has been sold in the subregion on online markets and illicit local markets and sold as, or mixed with, heroin and counterfeit opioids.[30]

Heroin remains the most common opioid used in Western and Central Europe, but there are increasing signs of misuse of pharmaceutical opioids in the subregion. In 2015, 17 countries reported that more than 10 per cent of all opioid users entering treatment services did so for disorders related to use of opioids other than heroin. Opioids reported by treatment entrants included methadone, buprenorphine, fentanyl, codeine, morphine, tramadol and oxycodone.[31] In some countries, pharmaceutical opioids such as fentanyl (Estonia) and buprenorphine (Finland) have been the most frequently misused opioid for some time. In Czechia, although heroin remains the most frequently misused opioid, other opioids make up over half of the share of all

FIG. 15 Annual prevalence of non-medical use of pharmaceutical opioids in European countries, 2016 or the latest year



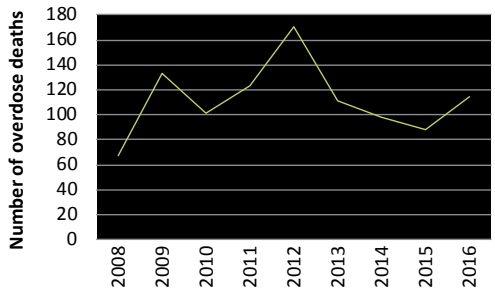
Source: UNODC, based on responses to the annual report questionnaire.

29 EMCDDA, *European Drug Report 2017: Trends and Developments*.

30 Ibid.

31 Ibid.

FIG. 16 Trends in fentanyl overdose deaths in Estonia, 2008–2016



Source: Estonian causes of death registry, 2017.

Note: In 2016, of 114 fentanyl overdose deaths in Estonia, 67 cases were attributed to 3-methylfentanyl, while the remaining were attributed to carfentanyl, furanylfentanyl and acrylfentanyl.

opioids used among those entering treatment for opioid-use disorders.[32]

Although not to the same extent as in the United States, overdose deaths related to fentanyl and its analogues are also reported in Western and Central Europe. Between November 2015 and February 2017, 23 deaths associated with furanylfentanyl were reported in Estonia (4 deaths), Finland (1), Germany (4), Sweden (12), United Kingdom (1) and Norway (1).[33] Similarly, from April to December 2016, 47 deaths attributed to acrylfentanyl were reported in Denmark (1 death), Estonia (3) and Sweden (43). Many of those deaths were reported among high-risk opioid users.[34]

Non-medical use and trafficking of tramadol is emerging as the main concern in several regions

Most of the tramadol seized worldwide in the period 2012–2016 originated in India and, to a lesser extent, in China.[35] Tramadol is smuggled to various markets in West and Central Africa and North Africa, from where some of it is trafficked onwards to a number of countries in the Near and Middle East.

There is a range of pharmaceutical opioids that are used non-medically in most regions. However, the non-medical use of tramadol is of particular concern in Western and Northern Africa and in many countries in the Near and Middle East. While population-based estimates of their use are not available in that subregion, treatment provision data suggest that the extent of the non-medical use of pharmaceutical opioids in these subregions is quite high. Although fatal overdose deaths attributed to pharmaceutical opioids are small in numbers, many countries in the subregion also report them. In the United Arab Emirates, while tramadol was dominating by far the pharmaceutical opioids detected in people in treatment, the situation changed over the period 2013-2015.[36] Based on urine analysis of people in treatment, although the number of samples containing tramadol remains high, it has declined by half whereas the number of other opioids such as, morphine and codeine doubled over the period 2013-2015. In 2015, 23 overdose deaths attributed to pharmaceutical opioids were reported in the United Arab Emirates.[37]

The first ever assessment of problem drug use in Palestine in 2016 estimated that 1.8 per cent of the male population aged 15 years and older were high-risk drug users. In Gaza, tramadol was the most commonly used substance, followed by benzodiazepines and methamphetamine. In the study sample of high-risk users, 97 per cent of respondents in Gaza reported non-medical use of tramadol, while in the West Bank, amphetamines

32 Ibid.

33 EMCDDA, Furanylfentanyl Report on the Risk Assessment of N-phenyl-N-[1-(2-phenylethyl)piperidin-4-yl] furan-2-carboxamide (furanylfentanyl) in the Framework of the Council Decision on New Psychoactive Substances, Risk Assessments (Luxembourg, Publications Office of the European Union, 2017).

34 EMCDDA, Acryloylfentanyl: Report on the Risk Assessment of N-(1 phenethylpiperidin-4-yl)-N-phenylacrylamide (acryloylfentanyl) in the Framework of the Council Decision on New Psychoactive Substances, Risk Assessments (Luxembourg, Publications Office of the European Union, 2017).

35 UNODC, annual report questionnaire data; *Report of the International Narcotics Control Board for 2016* (E/INCB/2016/1) (and the Board's annual reports for previous years); Heads of National Law Enforcement Agency (HONLEA) report for 2016 (and previous years); *WHO Expert Committee on Drug Dependence: Thirty-sixth Report*, WHO Technical Report Series, No. 902 (Geneva, World Health Organization, 2002); and Bureau for International Narcotics and Law Enforcement Affairs, International Narcotics Control Strategy Report 2017 (and previous years).

36 Abuelgasim Elrasheed and others, "Changing patterns of substance abuse: analysis of lab test results of a patient cohort at the National Rehabilitation Center, Abu Dhabi, UAE", *International Addiction Review*, vol. 1, No. 1. (2017).

37 Responses to the annual report questionnaire submitted by United Arab Emirates, 2015.

Tramadol

Tramadol is the generic name for an opioid analgesic, first marketed by Grünenthal in 1977. It is used in the treatment of moderate to severe pain. The analgesic effect is multimodal and involves agonist activity at the μ-opioid receptor and adrenergic and serotonergic properties. The metabolite of tramadol, *O*-desmethyltramadol is primarily responsible for the agonist activity at the μ-opioid receptor, while the parent compound acts as a serotonin releaser and inhibits the reuptake of noradrenaline and serotonin, leading to mood enhancement.

The usual oral doses of tramadol are 50 to 100 mg every 4 to 6 hours, with a maximum daily dose not exceeding 400mg.[a] Tramadol may also be used orally as an extended-release or a variable-release formulation, once or twice daily. Preparations of tramadol are also available for parenteral, rectal, sublingual and intranasal administration.

Tramadol is extensively metabolised in the liver following oral administration. The metabolic reaction to the active μ-opioid agonist, *O*-desmethyltramadol, depends on the activity of the hepatic enzyme CYP 2D6, which displays genetic polymorphism in man. Slow metabolizers have relatively low plasma concentrations of *O*-desmethyltramadol, whereas rapid metabolizers have relatively high plasma concentrations of this active metabolite.[b] The corollary is a difference in expression of the net effect of tramadol on mood and of *O*-desmethyltramadol on the μ-opioid receptor. Of significance is the established body of knowledge that a number of medicines and drinks, such as grapefruit juice, can inhibit CYP 2D6 activity in man. In fact, several internet drug-user forums report on user experiences of combining tramadol with grapefruit juice to preserve or enhance its mood-enhancing properties, at the expense of the *O*-desmethyltramadol mediated analgesic effect.

According to WHO,[c] tramadol can produce physical dependence, with studies showing that this dependence may occur when tramadol is used daily for more than a few weeks. Since 2013, Member States, through several resolutions of the Commission on Narcotic Drugs[d, e] and its regional subsidiary bodies, particularly in Africa[f] and the Middle East,[g] have highlighted problems with the non-medical use of tramadol. In 2017, the WHO Expert Committee on Drug Dependence reported[h] that there was growing evidence of misuse of tramadol in many countries, accompanied by adverse reactions and tramadol-associated deaths and recommended a critical review of the substance. The UNODC early warning advisory on new psychoactive substances has received reports of seizures of both tramadol and *O*-desmethyltramadol.

a *Martindale: The Complete Drug Reference,* 38th ed. (London, Pharmaceutical Press, 2014).

b K. Miotto and others, "Trends in tramadol: pharmacology, metabolism, and misuse", Anesthesia and Analgesia, vol. 124, No. 1 (2017), pp. 44–51.

c WHO Expert Committee on Drug Dependence, "Tramadol: pre-review report", Thirty-ninth Meeting, Geneva, 6–10 November 2017.

d Joint Ministerial Statement of the 2014 high-level review by the Commission on Narcotic Drugs of the implementation by Member States of the Political Declaration and Plan of Action on International Cooperation towards an Integrated and Balanced Strategy to Counter the World Drug Problem (See Official Records of the Economic and Social Council, 2014, Supplement No. 8 (E/2014/28), chap. I, sect. C).

e Commission on Narcotic Drugs resolution 56/14 on strengthening international cooperation in addressing the non-medical use and abuse, the illicit manufacture and the illicit domestic and international distribution of tramadol (2013).

f Commission on Narcotic Drugs resolution 56/2 on the Accra declaration (2013).

g Commission on Narcotic Drugs resolution 59/2 on the outcomes of the meetings of the subsidiary bodies of the Commission on Narcotic Drugs, including the Abu Dhabi declaration (2016).

h *WHO Expert Committee on Drug Dependence: Thirty-ninth Report, WHO* Technical Report Series, No. 1009 (Geneva, World Health Organization, 2017).

were the most consumed substances, followed by cannabis, anticonvulsants (mainly pregabalin) and benzodiazepines.[38]

Many countries in West and Central Africa and North Africa (mostly Egypt) have reported large quantities of tramadol seized; however, information on the non-medical use of tramadol and other pharmaceutical opioids in those subregions is limited. Tramadol tablets available in some parts of Africa are reportedly meant for the illicit market and may be of a dosage higher than that normally prescribed for medical purposes. In Egypt, for example, the authorities report the availability of 225 mg tablets of tramadol on the illicit market, which are far stronger than the usual 50 mg tablets available for pain relief and the slow-release tablets that range from a strength of 50 mg to 200 mg.[39]

38 Palestinian National Institute of Health and UNODC, *Estimating the Extent of Illicit Drug Use in Palestine* (November, 2017).

39 Egypt, General Secretariat of Mental Health of the Ministry of Health, "Report of the General Secretariat of Mental Health and Addiction Treatment on tramadol" (2017).

Tramadol in Ghana, 2016–2017

Non-medical use of tramadol in Ghana was first identified by the authorities in 2016, leading to the opioid being controlled at national level in that year. This resulted in the market for recreational use of tramadol disappearing, at least temporarily, although, despite its use being limited to medical purposes, new incidences of use of tramadol, which was being illegally imported, were observed in 2017.

There are no hard data to help determine the magnitude of non-medical use of and trafficking in tramadol in Ghana, but qualitative reporting from authorities has identified this as a fast emerging threat. Tramadol has been found to be increasingly used by gang members, commercial vehicle drivers, women who work in markets who need to trade long hours and students trying to keep awake during study periods. Tramadol is often used together with energy drinks, alcoholic beverages and marijuana, with users reporting taking tramadol to experience a feeling of euphoria, for extra energy or for aphrodisiac purposes. The authorities have identified increasing numbers of injuries and fatalities linked to driving under the influence of tramadol; the recruitment of young children as look-outs and drug peddlers; and overall increases in crime rates, including of drug-related crimes linked to other criminal activities, such as robbery, rape, abduction, murder and violence, among tramadol users and tramadol trafficking gangs, who often use machetes, broken bottles and other weapons in their confrontations.

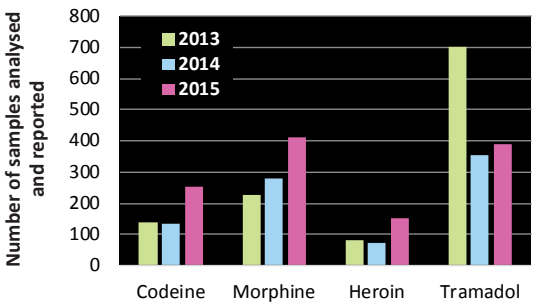
Police raids on markets in the suburbs of Accra and analyses of drugs seized by the laboratory of the Food and Drug Authority of Ghana revealed that capsules of high tramadol content, far above the usual adult medical dose (50–100 mg per capsule), are increasingly being sold. Most (40 per cent) of the 524,00 tramadol capsules seized and analysed in Ghana in 2017 had a content of 120 mg of tramadol, 18 per cent had a content of 200 mg, and a further 19 per cent had a strength of 225 mg per capsule. Only a small portion (13 per cent) of the tramadol seized had a typical content for medical purposes of 50–100 mg per capsule. About 87 per cent of the tramadol seized in 2017 originated in India, while no country of origin could be identified for the remaining quantities seized. It is, however, unclear whether the seized packages had been illicitly manufactured or diverted from licit manufacturing and where the diversion took place.

Source: Food and Drugs Authority, Ghana.

In Egypt, tramadol is reported to be the main opioid for non-medical use, with an estimated 3 per cent of the population diagnosed with tramadol dependence in 2016. In drug treatment, tramadol is also the main drug reported, with nearly 68 per cent of drug treatment patients in 2017 being treated for tramadol use disorders. High levels of emergency room cases (fatal and non-fatal) attributed to the non-medical use of tramadol are also reported in Egypt.[40]

Also in Nigeria, the non-medical use of opioids is of concern. In 2016, cannabis (45 per cent) and opioids (36 per cent) were the main substances, excluding alcohol, for which people sought treatment for their drug use disorders. Most people treated for opioid use disorders were misusing tramadol, codeine and pentazocine.[41]

FIG. 17 Trends in the non-medical use of pharmaceutical opioids and heroin among persons in treatment in the United Arab Emirates, 2013–2015

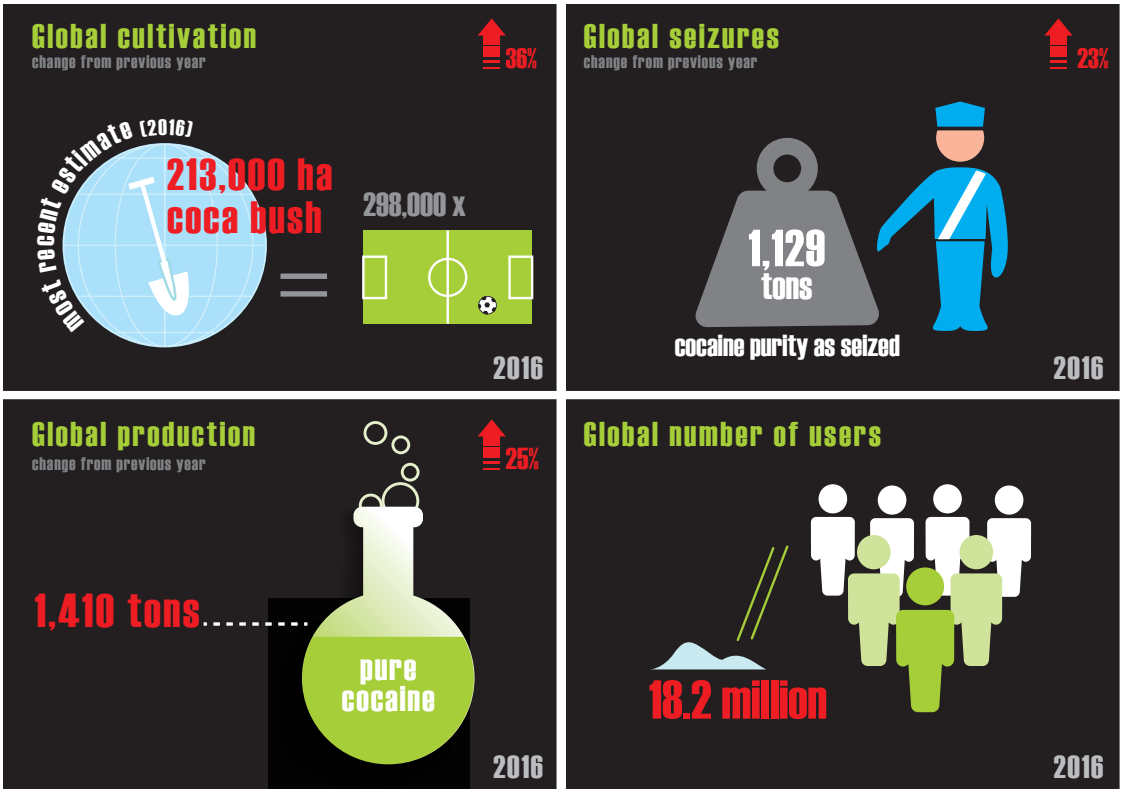


Source: Abuelgasim Elrasheed and others, "Changing patterns of substance abuse: analysis of lab test results of a patient cohort at the National Rehabilitation Center, Abu Dhabi, UAE", *International Addiction Review*, vol. 1, No. 1. (2017).

40 Ibid.

41 Nigeria, National Drug Law Enforcement Agency, "Patterns of drug and alcohol use in Nigeria" (2016).

B. COCAINE



Note: All data refer to 2016.

After the downward trend, coca bush cultivation is expanding dramatically

After the peak in 2000, there was a long-term downward trend in coca bush cultivation that came to an end in 2013, and since then the global area under coca bush cultivation has increased by 76 per cent to reach 213,000 ha in 2016. The increase in coca bush cultivation in 2016 reported in Bolivia (Plurinational State of), Colombia and Peru took place in parallel with the decline in eradication reported in all three Andean countries.

The increase in coca bush cultivation in Colombia is the main driver of global expansion

Recent trends in the global area under coca bush cultivation have largely been driven by changes in coca cultivation in Colombia, where the cultivation area decreased by 70 per cent over the period 2000–2013 only to then triple in size from 2013 to 2016. With 146,000 ha under coca cultivation in 2016, Colombia accounted for 68.5 per cent of the global cultivation area. Coca bush cultivation is widespread in Colombia, having been identified in 21 of the country's 33 departments in 2016, although more than two thirds of the total area under cultivation is located in the southern area of the country. The increase in coca bush cultivation in Colombia in 2016 came about for a number of reasons related to market dynamics and the strategies of trafficking organizations. Among other factors, it was also linked to a perceived decrease in the risk of illicit activities following the suspension of aerial spraying, the expectations in some communities of receiving compensation for replacing coca bush cultivation, and a reduction in alternative development interventions, which has undergone a period of transition from an approach based on crop elimination to an approach based on promoting the rule of law.[1]

1 UNODC and Colombia, *Colombia: Monitoreo de Territorios Afectados por Cultivos Ilícitos 2016* (July 2017), p. 139.

The overall number of dismantled laboratories used for the manufacture of coca and cocaine products in Colombia more than doubled, from 2,334 in 2013 to 4,842 in 2016 (95 per cent of which were manufacturing coca paste and cocaine base, while 5 per cent were manufacturing cocaine hydrochloride),[2] the largest number ever reported. Seizures of cocaine hydrochloride more than doubled in Colombia, from 167 tons in 2013 to a record 378 tons in 2016; in addition, 43 tons of coca paste and cocaine base were intercepted in 2016.[3] Eradication (manual eradication and spraying) fell, from more than 213,000 ha in 2006 to 69,000 ha in 2013 and less than 18,000 ha in 2016, while aerial spraying ceased in October 2015. Farmers cultivating coca bush may have felt that the threat of eradication had diminished, and some of them may have therefore felt emboldened to take collective action to block potential manual eradication efforts and were thus inclined to increase their coca bush production.[4]

Signs of increases in traditional coca bush cultivation areas in Peru

Following a decline that began in 2011, the area under coca bush cultivation in Peru increased to 43,900 ha in 2016, which was equivalent to 21 per cent of the global area under coca bush cultivation.

In 2016, Peru's coca bush production took place mainly to the east of Lima, across the Andes, in the Valle de los Ríos Apurimac, Ene y Mantaro (70 per cent) and further away in La Convencion y Lares (14 per cent). By contrast, most of Peru's coca bush production in the 1980s and 1990s took place in Alto Huallaga, in central Peru. By 2016, Alto Huallaga accounted for just 4 per cent of the total area under coca bush cultivation in Peru. However, the long-term downward trend came to an end in 2016 when the area under cultivation in Alto Huallaga rose, from a low level, by 45 per cent from the previous year. None of the two main coca bush cultivation areas today (Valle de los Ríos Apurimac, Ene y Mantaro, and La Convencion y Lares) were subject to eradication in 2016.[5]

2 Ibid., p. 151.

3 Ibid., p. 154.

4 Ibid., p. 14.

5 UNODC and the National Commission for Development and Life without Drugs (DEVIDA) of Peru, *Peru: Monitoreo de Cultivo de Coca 2016* (November 2017).

The downward trend in coca bush cultivation in the Plurinational State of Bolivia has also come to an end

The Plurinational State of Bolivia accounted for 10 per cent of global coca cultivation in 2016, when the area under coca bush cultivation in that country rose by 14 per cent, to 23,100 ha, returning to the level reported in 2013. The increase in 2016 ended the downward trend that started in 2010[6] and which was the result of, among other factors, a government policy based on "voluntary" reductions in coca bush cultivation in the coca-growing areas,[7, 8, 9] which went in parallel with eradication (as reported by the Government), particularly in national parks and other areas outside accepted cultivation areas. Overall, coca bush eradication almost doubled in the Plurinational State of Bolivia, from around 6,000 ha per year over the period 2005–2009 to around 11,000 ha per year over the period 2011–2015, then decreased to 6,600 ha of eradication in 2016, coinciding with the increase in cultivation reported that year.[10]

Global cocaine manufacture reached a record level in 2016

As a consequence of large increases in the areas under coca bush cultivation and improved cocaine manufacture know-how in the main coca leaf-producing areas, global cocaine manufacture is estimated to have reached an all-time high of some 1,410 tons in 2016, an increase of 25 per cent from the previous year. Most cocaine manufacture takes place in Colombia where, purely on the basis of estimated coca leaf production, cocaine manufacture

6 UNODC and the Plurinational State of Bolivia, *Estado Plurinacional de Bolivia: Monitoreo de Cultivos de Coca 2015* (July 2016).

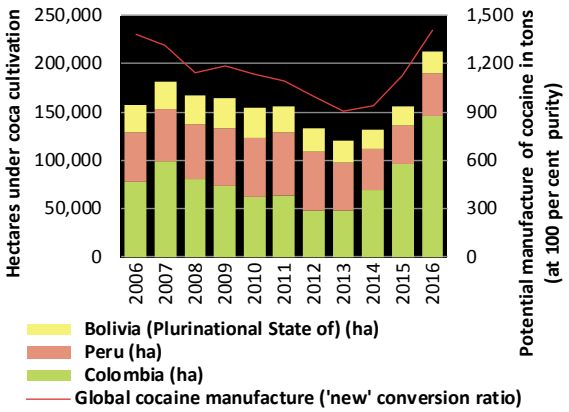
7 Ibid.

8 Plurinational State of Bolivia, Ministry of Rural Development, Agriculture, Livestock and the Environment, Agreement between the national Government and coca producers (14 September 2008).

9 Robert Lessmann, "Bolivien: zwischen Modellfall und Unregierbarkeit", in *Bolivien Staatszerfall als Kollateralschaden*, Thomas Jäger, ed. (Wiesbaden, Germany, VS Verlag für Sozialwissenschaften, 2009), p. 54.

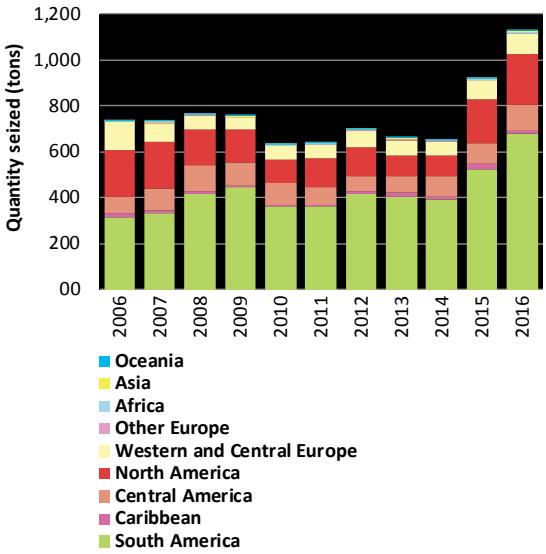
10 UNODC and the Plurinational State of Bolivia, *Estado Plurinacional de Bolivia: Monitoreo de Cultivos de Coca 2015*, p. 52.

FIG. 1 Global coca cultivation and cocaine manufacture, 2006–2016



Source: UNODC, coca cultivation surveys in Bolivia (Plurinational State of), Colombia and Peru, 2014 and previous years.

FIG. 2 Global quantities of cocaine seized,[a] by region (and some subregions), 2006–2016



Source: UNODC, responses to the annual report questionnaire.

[a] *Includes cocaine hydrochloride, coca paste and base, and "crack" cocaine; not adjusted for purity.*

reached an estimated 866 tons in 2016. This represents a 34 per cent increase from the previous year, and a threefold increase over the entire period 2013–2016. Cocaine manufactured from coca leaf production in Peru and Bolivia (Plurinational State of) also increased in 2016, although at a slower pace.

At record levels in 2016, the largest quantity of cocaine seized was in the Americas and Western Europe, but seizure quantities are rising sharply in other regions

The quantity of cocaine seized worldwide in 2016 rose by 23 per cent from the previous year to reach, at 1,129 tons,[11] the highest level ever reported.

The Americas continued to account for the vast majority of the cocaine intercepted worldwide in 2016 (more than 90 per cent of the total quantity seized), of which South America accounted for 60 per cent of the total (more than half of which was seized in Colombia). North America, led by seizures made in the United States (18 per cent), accounted for less than one fifth of the global total, and Central America accounted for 11 per cent of cocaine seized, most of which was seized in Panama. The next largest portion of the cocaine seized in 2016 was reported in Western and Central Europe (8 per cent), with the largest national total of cocaine seizures, for the first time ever, being that seized in Belgium (3 per cent of the global total), followed by Spain (1 per cent) and the Netherlands (1 per cent).

Most increases in the quantities of cocaine seized in 2016 took place outside the main cocaine destination markets of North America and Western and Central Europe, reflecting the ongoing spread of cocaine trafficking to emerging markets. For example, the quantity of cocaine seized in Asia tripled from 2015 to 2016, with most growth reported in South Asia, where the quantity seized increased tenfold, and in East and South-East Asia. The quantity of cocaine seized in the Near and Middle East/South-West Asia doubled in 2016.

The quantity of cocaine seized in Africa also doubled in 2016, most of that increase being reported in countries in North Africa, where the quantity of cocaine seized had a sixfold increase in 2016 from the previous year and accounted for 69 per cent of the quantity seized in the region. This contrasts with previous years, when cocaine was mainly seized in West and Central Africa.

11 This quantity is of cocaine seized with varying levels of purity. It is not comparable with the estimated amount manufactured, which is provided for cocaine of 100 per cent purity.

Marked increases were reported in South-Eastern Europe, where the quantity of cocaine seized more than tripled in 2016 from the previous year. The quantity of cocaine seized in Europe as a whole rose by 11 per cent in 2016.

The quantity of cocaine seized in Oceania rose by more than 75 per cent from 2015 to 2016, with Australia accounting for 98 per cent of all cocaine intercepted in Oceania.

Cocaine continues to be trafficked primarily from South America to North America and Western and Central Europe, but trafficking routes to other subregions are proliferating

Seizure data suggest that most cocaine is trafficked from the Andean countries to the main consumer markets of North America and Western and Central Europe. Although seizures of cocaine trafficked to other subregions are comparatively small, they suggest that cocaine trafficking to those subregions may be increasing rapidly, contributing to the proliferation of trafficking routes across the globe. In some countries in those subregions, law enforcement agencies may still be unfamiliar with cocaine trafficking as they are more used to focusing on other drugs with long-established markets. In such cases, seizure patterns may hide significant unreported cocaine trafficking.

The primary cocaine trafficking flow continues to be that from the Andean countries to North America, particularly from Colombia to the United States, which continues to be reported as the main destination country for cocaine shipments intercepted in South America. Data of the United States Drug Enforcement Administration showed that 92 per cent of the cocaine seizure samples analysed in 2016 originated in Colombia and 6 per cent originated in Peru,[12] with about 80 per cent being trafficked via the Pacific Ocean and the rest via the Atlantic Ocean (including by transiting the Caribbean corridor).[13] The predominance of trafficking via the Pacific Ocean is likely due to the concentration of coca leaf production and cocaine manufacture in southern Colombia, from where the closest access to the sea are the Pacific ports of Colombia and of neighbouring Ecuador. The cocaine has typically been trafficked from Colombia to Central America and Mexico, often using ships and semi-submersible vessels, and then from Mexico across the border into the United States by car or truck, mostly by Mexican organized crime groups. In 2016, however, the United States authorities reported that more cocaine was seized at sea (46 per cent of the total) than on land (41 per cent);[14] by comparison, in 2013, 81 —per cent of cocaine seized was being trafficked by land and 12 per cent by sea. This suggests that in 2016, less cocaine was being trafficked overland via Mexico into the United States. In fact, according to data reported by the United States, the proportion of cocaine trafficked into the United States via Mexico fell from 70 per cent of all cocaine inflows in 2013 to 39 per cent in 2016.[15]

In 2016, most of the cocaine destined for Canada was trafficked via the Caribbean; mostly via Jamaica and the Dominican Republic. Cocaine also transited the United States before reaching Canadian markets.[16]

The second largest cocaine trafficking flow worldwide is that from the Andean countries to Western and Central Europe. Over the period 2012–2016, Colombia was the departure country most often mentioned in connection with seized cocaine destined for European markets (20 per cent of all mentions in the responses to the annual report questionnaire by European countries to the question on countries of origin, departure and transit outside Europe), followed by Brazil (16 per cent) and Ecuador and the Dominican Republic (9 per cent each). Within Europe, Spain and the Netherlands were the countries most frequently reported as countries of transit, followed by Germany and Belgium.

Seizures of cocaine reported to have entered Europe via African transit countries were less frequent: they accounted for 6 per cent of mentions in the responses to the annual report questionnaire by European

12 United States Department of Justice, Drug Enforcement Administration, *2017 National Drug Threat Assessment* (October 2017|), p. 87.

13 Ibid., p. 93.

14 A further 8 per cent of the cocaine was intercepted while it was being sent by mail, and 4 per cent while being trafficked by air in 2016 (UNODC, annual report questionnaire data).

15 UNODC, annual report questionnaire data.

16 UNODC, annual report questionnaire data.

countries regarding Africa countries as countries of origin, departure or transit of cocaine over the period 2012–2016. Cocaine trafficking flows to Africa are primarily directed towards countries in West and Central Africa (5 per cent), often for shipment onward to Europe and, to a lesser extent, to Southern Africa (1 per cent). Brazil was the single most frequently mentioned country of departure for cocaine intercepted in all the subregions of Africa in the period 2012–2017. Overall, 2 per cent of all mentions by countries in the Americas mentioned countries in Africa as destination countries for cocaine seized in the period 2012–2016.

Cocaine seized in Asia over the period 2012–2016 also seems primarily to have departed from or transited Brazil. This applies to the two main cocaine destination subregions of Asia, the Near and Middle East/South-West Asia and East and South-East Asia, as well as to Central Asia and Transcaucasia. Seized cocaine trafficked in Asia often transited the United Arab Emirates, while the most frequently mentioned final destination countries in Asia are China (including Hong Kong, China), followed by Israel.

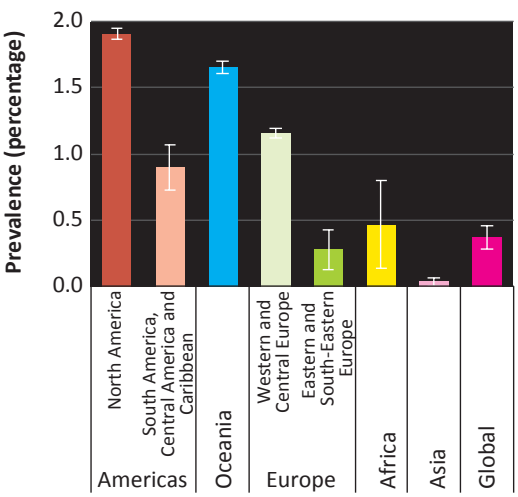
Cocaine flows to Oceania are predominantly directed towards Australia. Based on reported quantities of cocaine seized in Australia in the period 2012–2016, the most important departure countries for cocaine shipments to Australia were the United States, Chile, Brazil, Argentina and Canada.[17] That cocaine is being trafficked from the United States and Canada to Australia is likely due to the fact that the wholesale price of cocaine in Australia is higher than in North America. Cocaine wholesale prices in the United States ranged from $4,000 to $50,000 per kilogram in 2016, and in Canada from $41,000 to $59,000, while in Australia they ranged from $137,000 to $222,000 per kilogram.[18]

Given the existing trafficking routes, most of the cocaine interceptions take place at sea or close to it. Some 70 per cent of all cocaine seized (reported to UNODC by Member States as significant individual drug seizures) over the period 2012–2016 (cocaine hydrochloride and cocaine base) had been or was intended to be trafficked by sea (seized in international waters, territorial waters, seaports, maritime zones, beaches, vessels, boats and shipping containers). A further 15 per cent of the total quantity of cocaine intercepted was seized at airports, and the remaining 15 per cent was seized on land routes (roads, highways, vehicles, streets, warehouses, post offices, bars, residences, offices, etc.).[19]

Cocaine use is still concentrated in the Americas and Europe, and is on the increase

In 2016, the global number of past-year cocaine users is estimated to have increased by almost 7 per cent from the previous year, to 18.2 million (range: 13.9–22.9 million), with increases reported in most regions. More than half of all cocaine users reside in the Americas, mostly North America (34 per cent of the global total), and almost one quarter reside in Europe, mostly in Western and Central Europe (about one fifth of the global total). Africa and, to a lesser extent, Asia and Oceania together may account for the remaining quarter of all cocaine users, but there are significant error margins for these estimates due to the lack of data in many countries in Africa and Asia.

FIG. 3 Estimated annual prevalence rates of cocaine use among the population aged 15–64 years, 2016



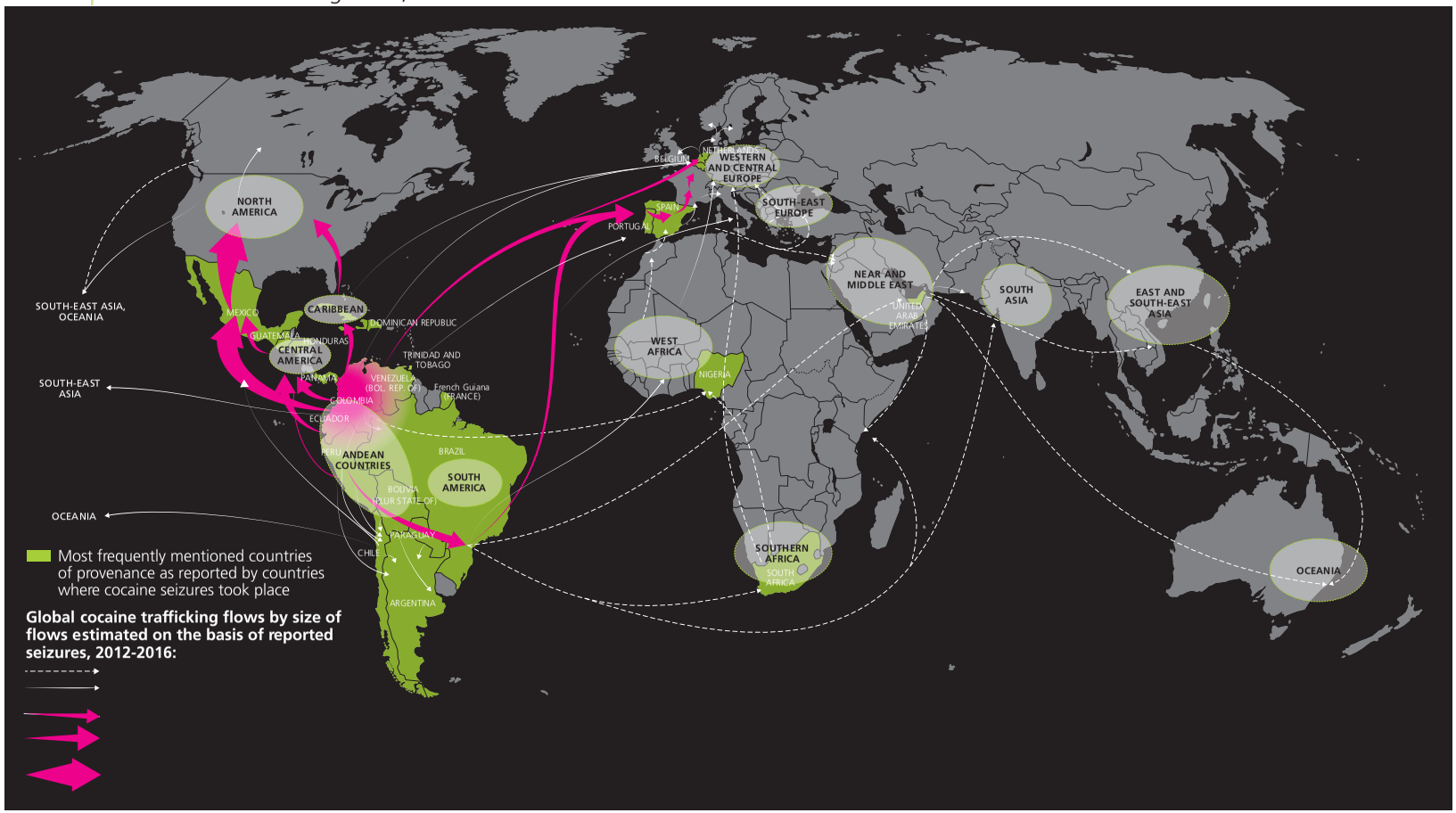
Source: UNODC estimates based on annual reports questionnaire data and other government reports.

17 Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2015–16* (Canberra, June 2017), p. 98; and the Commission's illicit drug data reports of previous years.

18 Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2015–16*, p. 102.

19 UNODC, the individual drug seizure database.

MAP 1 | Main cocaine trafficking flows, 2012–2016

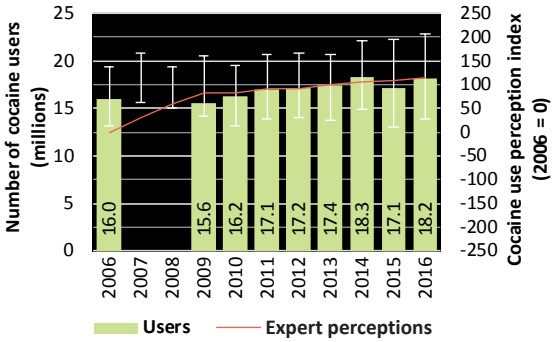


Sources: UNODC, responses to the annual report questionnaire and individual drug seizure database.

Notes: The size of the trafficking flow lines is based on the amount of cocaine seized in a subregion and the number of mentions of countries from where the cocaine has departed (including reports of "origin" and "transit") to a specific subregion over the period 2012–2016. The trafficking flows are determined on the basis of country of origin/departure, transit and destination of seized drugs as reported by Member States in the annual report questionnaire and individual drug seizure database: as such, they need to be considered as broadly indicative of existing trafficking routes while several secondary flows may not be reflected. Flow arrows represent the direction of trafficking: origins of the arrows indicate either the area of manufacture or the one of last provenance, end points of arrows indicate either the area of consumption or the one of next destination of trafficking.

The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations. Dashed lines represent undetermined boundaries. The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. The final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

FIG. 4 Trends in the number of annual cocaine users and cocaine use perception index, 2006–2016



Source: UNODC estimates based on annual report questionnaire data.

Note: For calculation methods and details, see the online methodology section of the present report.

Global annual prevalence of cocaine use was estimated at roughly 0.4 per cent of the global population aged 15–64 years in 2016, albeit with substantial variations from region to region. The subregion with the highest prevalence of cocaine use continues to be North America, where high prevalence rates are reported by the United States (2.4 per cent of the population aged 15–64 years) and Canada (1.5 per cent). Oceania as a whole also has a high prevalence of cocaine use, with prevalence of cocaine use in Australia among the population aged 14 years and older at 2.5 per cent. In Western and Central Europe, prevalence of cocaine use in the United Kingdom (2.3 per cent the population aged 16–59 years), Spain (2.0 per cent the population aged 15–64 years in 2015) and the Netherlands (1.9 per cent of the population aged 15–64 years in 2015) is also high.

Because only a limited number of countries provide new estimates every year,[20] error margins are so wide that it would be premature to draw conclusions about statistically significant increases. However, expert perceptions on changes in cocaine use[21] suggest an upward trend in cocaine use worldwide over the period 2006–2016. Although reported in all regions, the increase appears to have been most noticeable, especially in 2016, in the Americas, Africa and Asia.

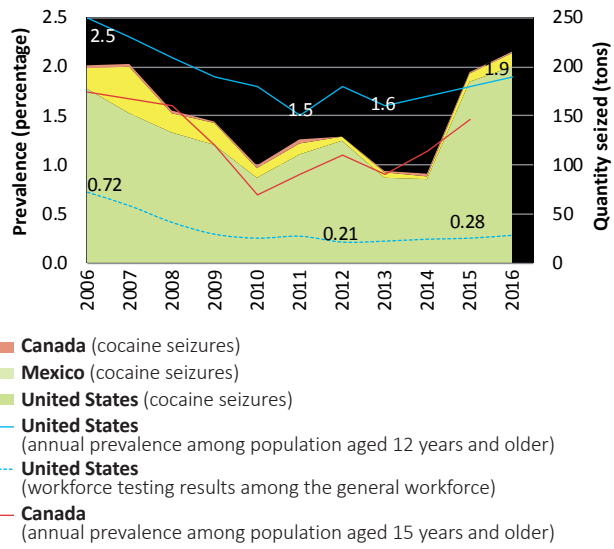
20 On average, 20–25 countries every year report new drug use estimates to UNODC.

21 See the online methodological annex of the present report.

Continued growth in the North American cocaine market

Most indicators in North America, the world's largest cocaine market, point to an expansion of the cocaine market from 2013 onwards, mirroring the changes in Colombia when the long-term downward trend in cocaine manufacture was reversed. The annual prevalence of cocaine use among the general population in Canada and the United States has been increasing since 2013. Further, data in the United States have shown an increase since 2013 in urine samples of the workforce that tested positive for cocaine, while from 2013 to 2016 the number of people initiating cocaine use rose by 80 per cent, returning to the level reported in 2002.[22] The quantity of cocaine seized in the United States rose by more than 40 per cent, and by almost 50 per cent in North America as a whole, over the same period (2013–2016).

FIG. 5 Seizures of cocaine in North America and annual prevalence of cocaine use in the United States and Canada, 2006–2016



Source: UNODC, annual report questionnaire data; Substance Abuse and Mental Health Services Administration of the United States, *National Household Survey on Drug Use and Health*; Quest Diagnostics; Quest Diagnostics Drug Testing Index for 2016 and previous years; Health Canada, Canadian Alcohol and Drug Use Monitoring Survey; and Statistics Canada, Canadian Tobacco, Alcohol and Drugs Survey, 2015.

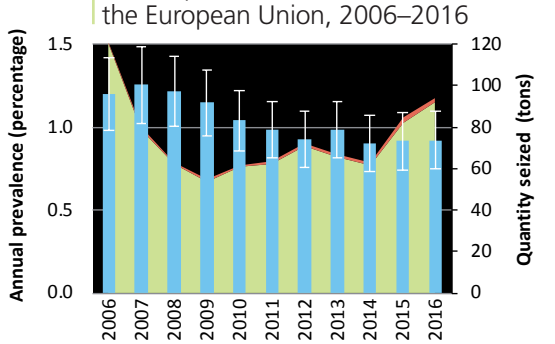
22 Substance Abuse and Mental Health Services Administration of the United States, *Key Substance Use and Mental Health Indicators in the United States: Results from the 2016 National Survey on Drug Use and Health.*

The number of cocaine-related deaths in the United States doubled over the period 2013–2016, rising from less than 5,000 to more than 10,000. However, since most of those deaths were related to the use of cocaine in combination with synthetic opioids (66 per cent in 2015,[23] up from 45 per cent in 2006),[24] they cannot be attributed exclusively to cocaine consumption.

Likely expansion of the cocaine market in Europe

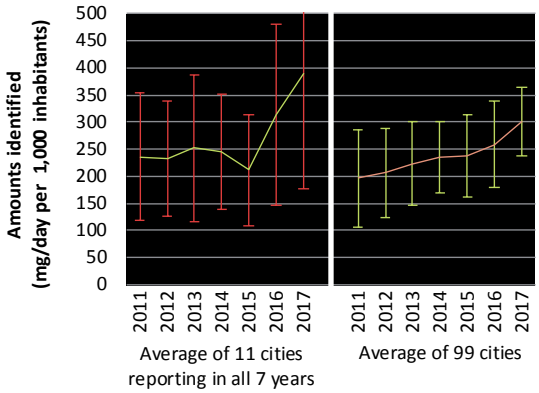
The overall prevalence of cocaine use in the European Union is about half the rate reported in the United States. Based on limited data, the prevalence of cocaine use in Europe is perceived to have remained relatively stable in recent years, but there are also indications that the supply of cocaine to Europe has been increasing again. For example, although the quantity of cocaine seized in Europe fell from the peak of 121 tons seized in 2006 to 55 tons in 2009, it then almost doubled, to 94 tons in 2016, and rose by 50 per cent from 2014 to 2016. European Union countries accounted for 98 per cent of all the cocaine seized in Europe in 2016, as well as for the bulk of cocaine consumption in the region. UNDOC estimates that some 70 per cent of all European cocaine users reside in European Union countries and more than 85 per cent in Western and Central Europe.

FIG. 6 Seizures of cocaine in Europe and annual prevalence of cocaine use in the European Union, 2006–2016



Source: UNODC calculations based on annual report questionnaire data; and EMCDDA.

FIG. 7 Benzoylecgonine found in wastewater per 1,000 inhabitants in Europe (based on data from 99 European cities), 2011–2017



Source: UNODC calculations based on information from Sewage Analysis CORe Group—Europe (SCORE).

Note: Data included are from the analysis of wastewater in 27 European countries over the period 2011–2017. For calculation methods and details, see the online methodology section of the present report.

In contrast to prevalence surveys, which suggest that past-year cocaine use has remained rather stable, wastewater analysis points to a likely expansion of the European cocaine market in terms of the quantity consumed in recent years. The analysis of benzoylecgonine (a cocaine metabolite) in wastewater undertaken in cities across West, Central and South-Eastern Europe points to a growth in cocaine consumption over the period 2011–2017, particularly in the last two years of that period.

After growing until 2016, the cocaine market in Oceania may now be stabilizing

Conducted in 2016, the latest household survey in Australia confirmed a long-term upward trend in cocaine use in Oceania, with an annual prevalence of cocaine use of 2.5 per cent of the population aged 14 years and older in 2016,[25] which is relatively high by global standards. A number of other cocaine indicators have also shown an upward trend in recent years, including positive drug tests of detainees and

23 No breakdown of cocaine-related deaths for 2016 was available at the time of writing this report.

24 United States, National Institute on Drug Abuse, National Center for Health Statistics, CDC Wonder, National overdose deaths from select prescription and illicit drugs, 2017.

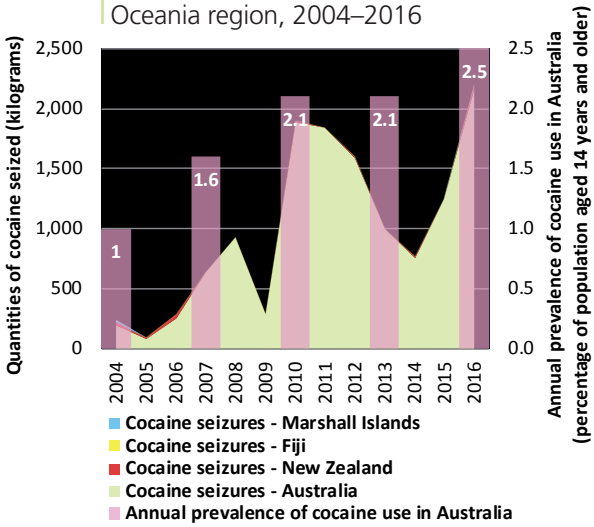
25 Australian Institute of Health and Welfare, *2016 National Drug Strategy Household Survey.*

use of cocaine among "ecstasy" users in Australia.[26] In parallel, the quantities of cocaine seized have also increased, reaching a record level in Oceania (notably in Australia) in 2016, as did the number of cocaine seizures and the number of cocaine-related arrests.

By contrast, cocaine purity decreased in Australia's main cocaine market, New South Wales (although prices increased slightly in Australia as a whole) in 2016, when the perceived availability of cocaine (by injecting drug users and regular "ecstasy" users) also decreased.[27] Taken together with the slight increase in wholesale prices in 2016,[28] this suggests a possible reduction in the availability of cocaine in Australia in 2016. Moreover, the analysis of wastewater data in Australia showed that cocaine consumption in 2017 had stabilized close to the level reported in late 2016.[29]

Despite very high prevalence rates in Australia, treatment demand for cocaine use in Oceania as a whole seems to be low,[30] suggesting that, compared with the North American and the European markets, the number of people experiencing drug use disorders from cocaine use may be limited. Indeed, while the annual prevalence of cocaine use in Australia is three times that reported in the European Union, wastewater analysis suggests that the amount of cocaine consumed per capita (average benzoylecgonine content in wastewater per 1,000 inhabitants) in Australia is clearly below the European average.[31] The price of cocaine in Australia, already very high compared with the markets in other developed countries,[32] may be a factor behind the comparatively low consumption of cocaine, leading to fewer cocaine use disorders in Australia than in other major cocaine markets.

FIG. 8 Annual prevalence of cocaine use in Australia and cocaine seizures in the Oceania region, 2004–2016



Source: UNODC, annual report questionnaire data; and Australian Institute of Health and Welfare, *2016 National Drug Strategy Household Survey.*

26 Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2015–16*, pp. 91–108.

27 Ibid., pp. 91–108.

28 Ibid., p. 102.

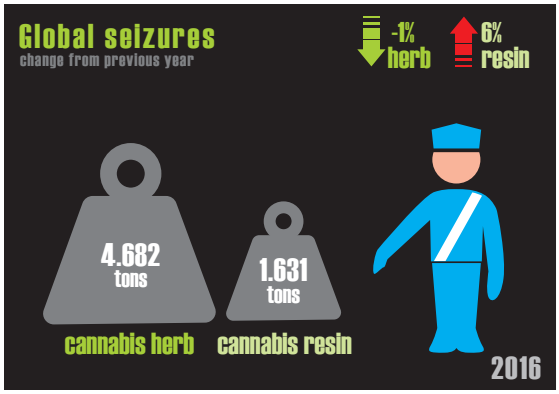
29 Australian Criminal Intelligence Commission, *National Wastewater Drug Monitoring Program*, Report No. 3 (November 2017), p. 40.

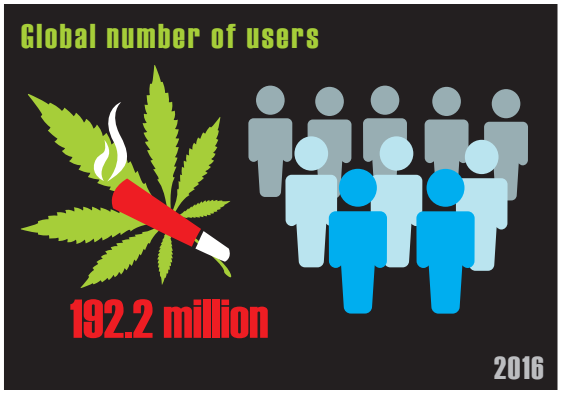
30 UNODC, annual report questionnaire data.

31 SCORE, Sewage Analysis CORe Group–Europe (SCORE) and Australian Criminal Intelligence Commission, *National Wastewater Drug Monitoring Program*, Report No. 3 (November 2017).

32 Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2015–16*, p. 102.

C. CANNABIS





Note: Data refer to 2016.

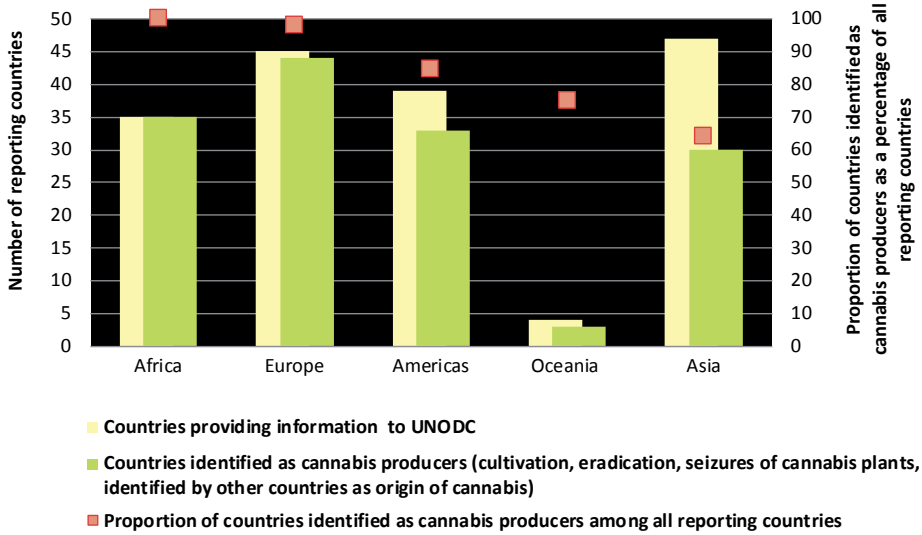
Cannabis production continues to affect all regions worldwide

Cannabis plant cultivation was reported —through either direct indicators (cultivation or eradication of cannabis plants) or indirect indicators (seizures of cannabis plants, origin of cannabis seizures as reported by other Member States) — by 145 countries (or 85 per cent of countries reporting to UNODC) over the period 2010–2016, representing 94 per cent of the world's total population.

Global seizures of cannabis herb declined in 2016, while seizures of cannabis resin continued to rise

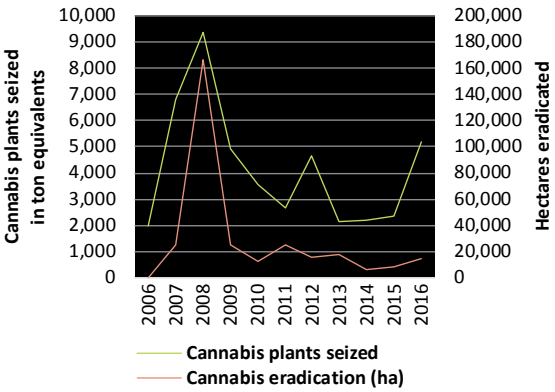
There is a lack of systematic and direct measurements of cannabis cultivation and production, which exist in only a few countries and are not carried out on a regular basis. However, a number of countries report on cannabis plants seized and on the eradication of cannabis; the data available suggest a peak in eradication activities in 2008 (reflecting the

FIG. 1 Number of countries affected by cannabis production and number of countries reporting drug-related information to the United Nations Office on Drugs and Crime, 2010–2016



Source: UNODC, responses to the annual report questionnaire.

FIG. 2 Global quantity of cannabis plants seized and eradication of cannabis plants, 2006–2016



Source: UNODC, responses to the annual report questionnaire.

large amounts of cannabis plant seizures in Paraguay and large areas of cannabis eradication in Albania that year), and an increase in 2016, mainly a result of increases in cannabis plant seizures in Albania, Guatemala, the Philippines and Tajikistan and an increase in the area of cannabis cultivation eradicated in India.

Cannabis herb

As in previous years, the largest quantity of cannabis herb seized in 2016, accounting for almost two thirds of the global total, was reported in the Americas. North America accounted for 39 per cent of the global total, and South America and Central America and the Caribbean for 23 per cent. The next largest seizure amounts reported for regions were those of Africa (17 per cent), Asia (14 per cent), Europe (6 per cent) and Oceania (0.2 per cent). Whereas the amounts of cannabis plants seized and area of eradication increased, the global quantity of cannabis herb seized decreased by 22 per cent from 2015 to 2016, to 4,682 tons, the lowest level since 2000. That decrease in the amount of cannabis herb seized in 2016 was mainly due to the 51 per cent decrease reported in Africa (partly a reflection of reporting issues) and the 25 per cent decrease in the Americas, whereas the quantity of cannabis herb seized increased in Europe (49 per cent), Asia (135 per cent) and Oceania (6 per cent). The total number of cannabis herb seizure cases worldwide increased slightly in 2016 (2 per cent increase). In 2016, the quantity of cannabis plants seized increased in Africa (mainly in North Africa), Asia and Europe, and decreased in the Americas and Oceania.

While there is no evidence that the global cannabis market is shrinking (the global number of cannabis users continued to rise in 2016), the decline in the global quantity of cannabis herb seized may indicate a shift in the priorities of law enforcement authorities. This may be the case in North America in particular, where the availability of medical cannabis in many jusrisdictions and new legal frameworks that allow the cultivation of cannabis for recreational use in some states of the United States may have played a role.

By contrast, the quantities of cannabis herb seized increased in Europe, Oceania and Asia from 2015 to 2016. Over the period 2006–2016, cannabis herb seizures doubled in Europe, almost tripled in Asia and quadrupled in Oceania.

Even with the decline in cannabis herb seized in North America, the United States continued to be the country reporting the largest quantity of cannabis herb seized worldwide in 2016 (21 per cent of all cannabis herb seized), followed by Mexico (18 per cent). Cannabis herb seizures in the United States were, however, at 978 tons, at their lowest level since 2000, and cannabis herb seizures made in Mexico were, at 841 tons, at their lowest level since 1995. The next largest portions of the global quantity of cannabis herb seized were reported by Paraguay (9 per cent) — one of the largest cannabis-exporting countries in South America — followed by India (6 per cent), Brazil (5 per cent) and Egypt (4 per cent).

Cannabis resin

Trafficking in cannabis resin continues to be far more geographically concentrated than trafficking in cannabis herb. Some 50 per cent of the total quantity of cannabis resin seized worldwide in 2016 was intercepted in the Near and Middle East/South-West Asia, 23 per cent in North Africa, and 23 per cent in Western and Central Europe. Those three subregions thus accounted for 97 per cent of all cannabis resin seized worldwide in 2016.

The quantity of cannabis resin seized worldwide in 2016 was the second largest annual amount ever reported. The 6 per cent rise from 2015 to 2016,

Trafficking of cannabis herb continues to be predominantly intraregional in nature

Most trafficking of cannabis herb takes place in the region where it was produced, a phenomenon that has become even more pronounced since the spread of indoor cannabis cultivation.[a] The countries most frequently reported in the period 2012–2016 as countries of origin of cannabis herb by region and subregion are as follows.

Americas

The most frequently reported source country for transnational shipments of cannabis herb in North America was Mexico, followed by Canada. Cannabis is grown in Mexico (notably in the state of Sinaloa and neighbouring states),[b] in Canada, and all 50 states of the United States, mostly on the West Coast, in particular California.[c] While ongoing increases in the domestic cultivation of cannabis were reported in the United States in 2016, Mexico remained the most important foreign source of cannabis herb,[c] while lesser volumes were also smuggled from the Caribbean.[c] The importance of Mexico as a source country for the United States cannabis market appears to be declining, and that decline seems to be mostly due to perceived differences in the quality of marijuana.[c] While there are indications that some drug trafficking organizations in Mexico, in order to compete with cannabis produced in the United States, have started to produce higher-potency cannabis,[c] other organized crime groups have allegedly prompted Mexican farmers to increase cultivation of opium poppy.[b] In South America, the Caribbean and Central America, the most frequently reported source countries of cannabis herb were Colombia and Paraguay, followed by Jamaica. The vast majority of the cannabis produced in South America, the Caribbean and Central America is for consumption within the Americas.

Africa

In Africa, only 17 countries reported on the origin, transit and departure of cannabis herb over the period 2012–2016, suggesting a low level of transnational trafficking in the region. The most frequently mentioned countries of origin or transit of cannabis herb in the region were Ghana (reported by 5 countries), followed by Nigeria (3 countries), Mozambique (3 countries) and Swaziland (3 countries). Although most of the cannabis produced in Africa is for consumption within the region, a number of African countries (Nigeria, Ghana, South Africa and Zambia) have identified European countries as the final destination, notably the United Kingdom, the Netherlands and Italy.

Asia

In Asia, 26 countries reported on the origin, transit and departure of cannabis herb over the period 2012–2016. Most of the cannabis herb trafficking in the region seems to be at the national level. Only a handful of countries were identified by other countries as countries of origin or transit of cannabis herb: India (4 countries), Islamic Republic of Iran (reported by 4 countries) and Afghanistan (3 countries). As in other regions, most of the cannabis produced in Asia is for consumption within the region. One major exception is cannabis herb produced in Central Asia, which is often destined for Eastern Europe, particularly for the Russian Federation.[b] In addition, there are also some shipments of cannabis herb from North America (Canada and United States) to East Asia, notably Japan, the Republic of Korea and Hong Kong, China.[b]

Europe

Cannabis herb is produced in practically all European countries. The most frequently mentioned source countries for cross-border trafficking of cannabis herb were the Netherlands and Albania, followed at some distance by Czechia. Albania and the Netherlands reported the largest eradication of cannabis plant in Europe in recent years (Albania reported the eradication of 5,205 outdoor sites with a total of 2,536,288 cannabis plants in 2016; and Netherlands reported the eradication of 5,856 indoor sites with a total of 994,068 cannabis plants.).[b] Cannabis herb shipments from outside Europe seem to be of only minor importance and are limited to Central Asia (mostly for Eastern Europe), as well as some countries in Africa, the Americas, South-West Asia and South-East Asia. The overwhelming proportion (99 per cent of all mentions) of cannabis produced or imported into Europe was destined for final consumption in Europe.

Oceania

Most of the cannabis found in Oceania is locally grown and locally trafficked. Nevertheless, in Australia, the largest cannabis market in Oceania, a total of 38 "embarkation countries" for illegal cannabis imports were detected in the period 2015–2016, with most quantities smuggled by air cargo.[d] In Oceania as a whole, cannabis herb sourced from abroad mainly originates in or transits the United States, followed by Canada, the Netherlands and South Africa, while Australia is reported as a source by New Zealand.[b]

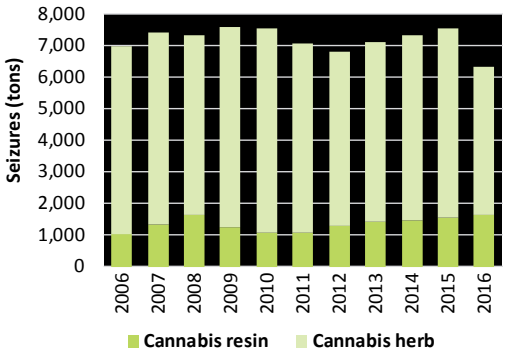
[a] European Drug Report 2017: Trends and Developments (EMCDDA, Luxembourg, Publications Office of the European Union, 2017) and previous years.

[b] UNODC, responses to the annual report questionnaire

[c] United States, Department of Justice, Drug Enforcement Administration, 2017 National Drug Threat Assessment (October 2017).

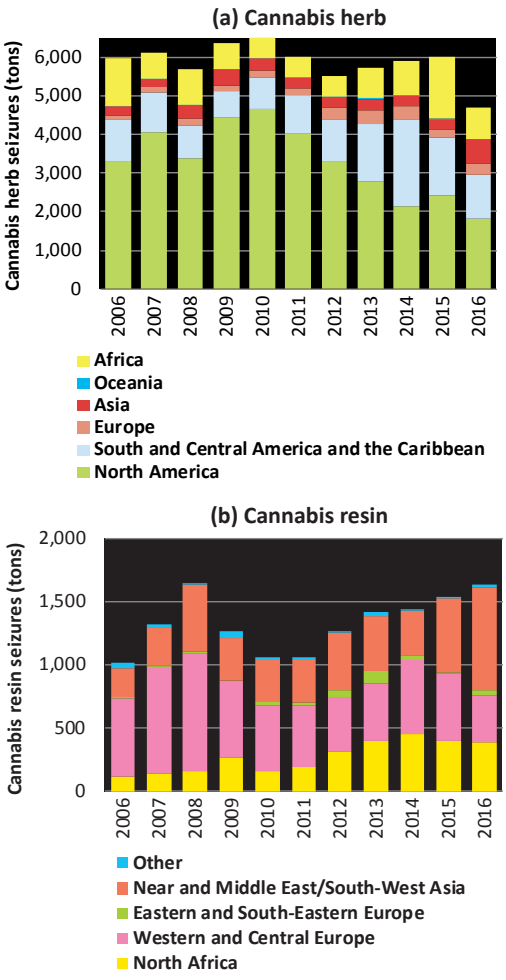
[d] Australian Criminal Intelligence Commission, Illicit Drug Data Report 2015–16 (Canberra, 2017), pp. 60–71.

FIG. 3 Global quantities of main cannabis products seized, 2006–2016



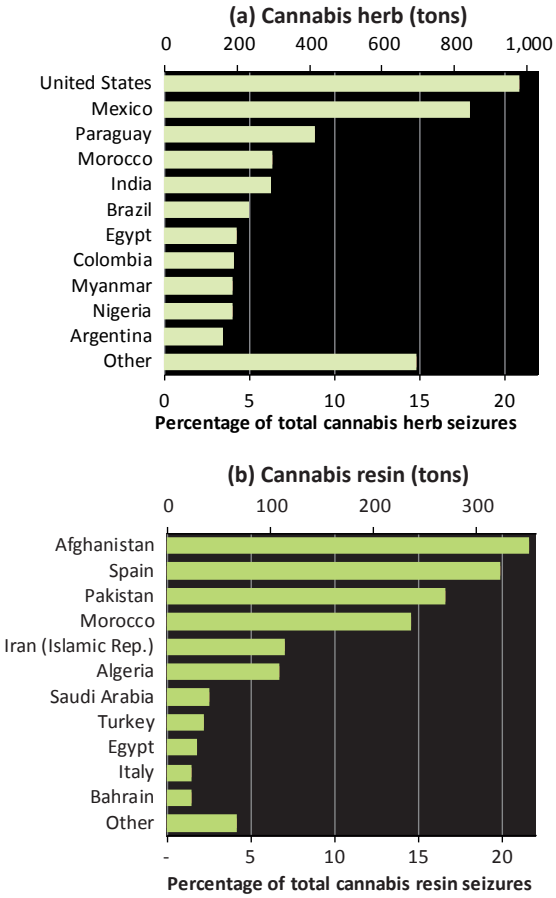
Source: UNODC, responses to the annual report questionnaire.

FIG. 4 Quantities of cannabis seized, by region, 2006-2016



Source: UNODC, responses to the annual report questionnaire.

FIG. 5 Quantities of cannabis seized, by country, 2016



Source: UNODC, responses to the annual report questionnaire.

to 1,631 tons, in the quantity of cannabis resin seized was primarily due to the 41 per cent increase in the quantity of cannabis resin seized in the Near and Middle East/South-West Asia, which more than tripled over the period 2006–2016. The quantity of cannabis resin seized in North Africa, by contrast, decreased by 3 per cent, while in Western and Central Europe — which for years was the main cannabis resin market — it fell by more than 30 per cent from 2015 to 2016. This seems to reflect an underlying shift away from the use of cannabis resin to the use of cannabis herb grown in Europe. For the first time ever, the largest quantity of cannabis resin seized in 2016 was reported by Afghanistan (22 per cent of the global total), followed by Spain (20 per cent), Pakistan (17 per cent) and Morocco (15 per cent).

Cannabis resin continues to be trafficked mostly from Morocco and Afghanistan to key destination markets

While the trafficking of cannabis herb — in contrast to the trafficking of other plant-based drugs — mostly takes place within the region of production (see box), there is substantial interregional trafficking of cannabis resin, most notably between North Africa and Western and Central Europe, between Central Asia and Eastern Europe and between the Near and Middle East/South-West Asia and Europe.

However, while cannabis herb has a global reach, cannabis resin has a more restricted market mainly confined to the Near and Middle East/South-West Asia, North Africa and Europe. Cannabis resin that is consumed within this smaller market mainly originates in Afghanistan and Morocco, although some also originates in other countries such as Lebanon and Pakistan.

Over the period 2012–2016, Morocco was reported as a source of cannabis resin by a large share of countries in North Africa (80 per cent of all mentions by countries in that subregion that reported the source of cannabis resin seized) and Western and Central Europe (41 per cent of mentions in that subregion). Some cannabis resin of Moroccan origin was also reportedly trafficked to Eastern Europe (27 per cent of all mentions in that subregion) and South-Eastern Europe (11 per cent of mentions). The largest quantities of cannabis resin seized in North Africa continues to be reported in Morocco and Algeria.[1] For years, Spain has been identified by other European countries as the principal country of departure and transit of cannabis resin in the region, accounting for 19 per cent of all such mentions in the period 2012–2016, followed by the Netherlands (14 per cent of all mentions), another important hub for cannabis trafficking in Europe.

Afghanistan is also an important source country of cannabis resin, with 19 per cent of all mentions by countries that reported the source of cannabis resin in the period 2012–2016. Cannabis resin originating in Afghanistan has been identified in countries in Central Asia and Transcaucasia, in Eastern Europe (most notably in the Russian Federation) and in Western and Central Europe (13 per cent of all mentions in that subregion). Lebanon was also mentioned as the source country by 7 per cent of reporting countries and Pakistan by 5 per cent. Those two countries supply cannabis resin to the neighbouring countries in the Near and Middle East/South-West Asia.

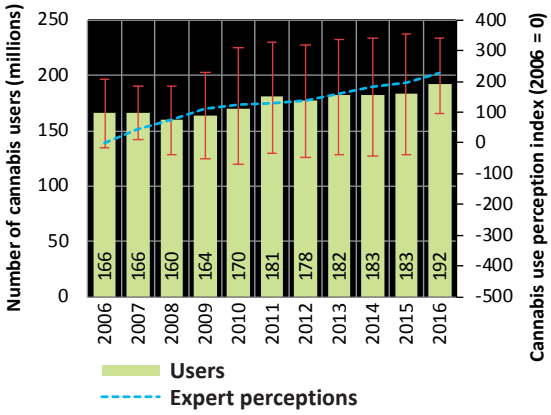
1 UNODC, responses to the annual report questionnaire.

Estimated global number of cannabis users higher in 2016

Cannabis continues to be the most widely used drug worldwide. UNODC estimates that roughly 3.9 per cent (range: 3.4–4.8 per cent) of the global population aged 15–64 years used cannabis at least once in 2016: some 192.2 million people (range: 165.8 million–234.1 million). The number of cannabis users estimated for 2016 is 16 per cent higher than the number estimated for 2006. As some large countries do not report hard data on cannabis use, this change may mask undetected changes, but qualitative assessments by national experts, as reported by an average of 77 Member States per year, confirm the trend of increasing cannabis use over the period 2006–2016.

According to the cannabis use perception index, the increase in cannabis use over the period 2010–2016 appears to have been greatest in countries in Asia and Africa, followed by increases in countries in the Americas and Europe. In Oceania, by contrast,

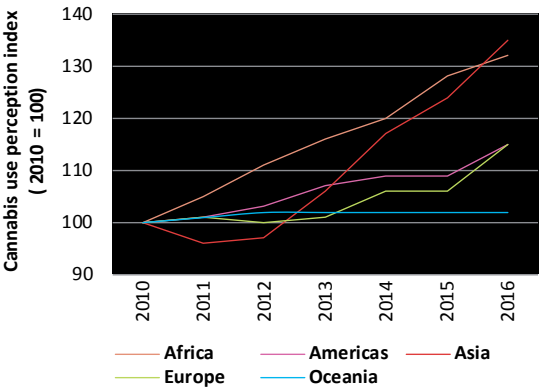
FIG. 6 Trends in the number of annual cannabis users and cannabis use perception index, 2006–2016



Source: UNODC, responses to the annual report questionnaire.

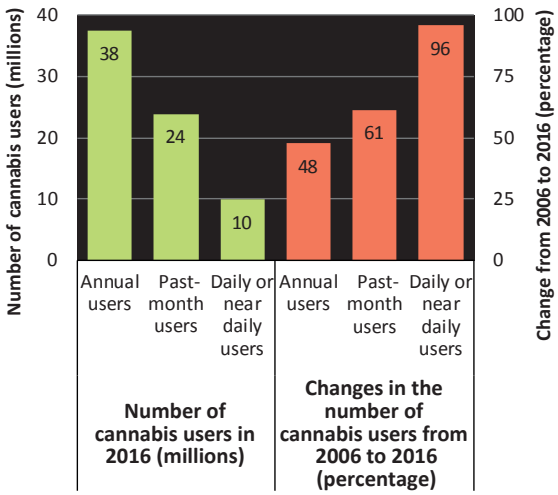
Note: For details on the perception index calculations, refer to the online methodological annex.

FIG. 7 Trends in cannabis use perception index, by region (2010 = 100)



Source: UNODC, responses to the annual report questionnaire.
Note: For further information on the calculations of drug use perception indexes, see the online methodological annex.

FIG. 8 Cannabis users in the United States, 2006–2016



Source: United States, SAMHSA, Center for Behavioral Health Statistics and Quality, (Rockville, Maryland, September 2017).

hardly any change has been reported in the past decade.

Cannabis use is still on the increase in North America

Cannabis use increased in the Americas in the past decade from 40.5 million people who used cannabis in the past year, or 6.9 per cent of the population aged 15–64 years, in 2006,[2] to 52.9 million, or 8.0 per cent of the population aged 15–64 years, in 2016. The increase was most pronounced in the United States where, after some minor decreases at the beginning of the 2000s, up until 2007, annual prevalence of cannabis use grew significantly thereafter to 13.5 per cent of the population aged 12 years and older in 2015, and 13.9 per cent in 2016.[3] These increases are taking place at a time when there is a decrease in risk perceptions[4] regarding the use of cannabis[5] and discussions in some individual states on the legalization of cannabis for recreational use. The growth in cannabis use in the United States exacerbated problematic patterns of consumption, as the number of daily or almost daily cannabis users almost doubled over the period 2006–2016, while the number of past-month users increased by 60 per cent and that of past-year users by almost half.[6]

In North America, comparatively high levels of cannabis use have also been reported in Canada, where cannabis use in the past year was reported by 14.7 per cent[7] of the population aged 15 years and older in 2015, up from 10.7 per cent in 2013,[8] and 9.1 per cent in 2011.[9]

2 *World Drug Report 2008* (United Nations publication, Sales No. E.08.XI.11), p. 112.

3 United States, SAMHSA, Center for Behavioral Health Statistics and Quality, *Key Substance Use and Mental Health Indicators in the United States: Results from the 2016 National Survey on Drug Use and Health*, HHS Publication No. SMA 17-5044, NSDUH Series H-52, (Rockville, Maryland, 2016).

4 Lloyd D. Johnston and others, , 2017 overview, (Ann Arbor, Michigan, University of Michigan Institute for Social Research, 2018).

5 Naji Salloum and others, "A reciprocal effects analysis of cannabis use and perceptions of risk", Addiction, vol. 113, No. 6 (2018), pp. 1077–1085; Eldon Spackman and others, "Marijuana use and perceptions of risk and harm: a survey among Canadians in 2016", Healthcare Policy, vol. 13, No. 1 (2017), pp. 17–27; Jason Kilmer and others, "Marijuana use, risk perception, and consequences: is perceived risk congruent with reality?", Addictive Behaviors, vol. 32, No. 12 (2007), pp. 3026–3033.

6 United States, SAMHSA, Center for Behavioral Health Statistics and Quality, *Results from the 2016 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, September 2017).

7 UNODC, responses to the annual report questionnaire, drawing on data from the Canadian Tobacco, Alcohol and Drugs Survey 2015.

8 Canada, Canadian Tobacco, Alcohol and Drugs Survey: summary of results for 2015.

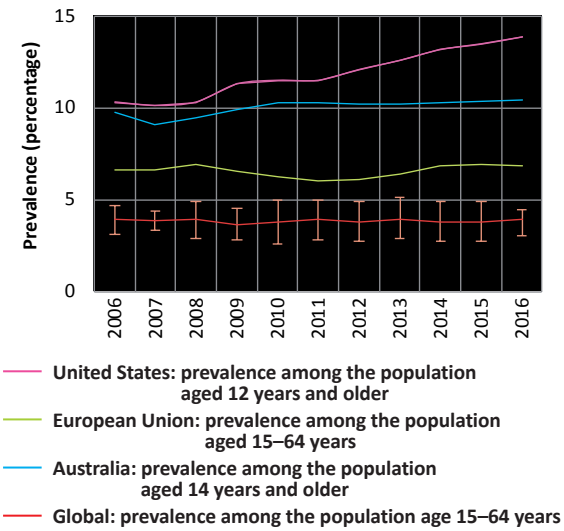
9 Canada, Canadian Alcohol and Drug Use Monitoring Survey: summary of results for 2011.

Cannabis use remains quite stable in Europe and in Oceania

Annual prevalence rates of cannabis use in Oceania, most notably Australia, were substantially higher than in the United States in the 1990s, but the annual prevalence of cannabis use in Australia decreased dramatically, from almost 18 per cent of the population aged 14 years and older in 1998 to roughly 10 per cent a decade later, and has remained at that lower level throughout the past decade.

Although above the global average, cannabis use in the European Union has fluctuated over the last decade, during which between 6 and 7 per cent of the population aged 15–64 years reported having used cannabis in the past year. The highest annual prevalence rates of cannabis use in Europe in recent years have been reported by countries in Western and Central Europe, notably France (11.1 per cent in 2015), Spain (9.5 per cent in 2015), Czechia (9.4 per cent in 2015), Italy (9.2 per cent in 2013/2014), Switzerland (9.1 per cent in 2016) and the Netherlands (8.7 per cent in 2015).[10]

FIG. 9 Annual cannabis use in the United States, the European Union, Australia and at the global level, 2006–2016



Source: UNODC, responses to the annual report questionnaire, SAMHSA, EMCDDA and the Australian Institute of Health and Welfare.

10 UNODC, responses to the annual report questionnaire.

The prevalence of cannabis use among students aged 15–16 years in Europe has remained largely stable over the past decade[11] — about twice the rate of the general population.

Developments in measures regulating non-medical use of cannabis

Since 2017, eight state-level jurisdictions in the United States have allowed non-medical use[12] of cannabis, as well as the District of Columbia.[13, 14] All those jurisdictions, except for the District of Columbia, are now licensing for-profit companies to produce, market and sell a wide range of cannabis products. All of the states that have legalized the production and sale of cannabis had prior measures allowing the medical use of cannabis.

The *World Drug Report 2017* looked at developments in cannabis legislation in the United States, in particular, the extent of exposure of the adult and youth populations to cannabis, as well as the interplay between the use of cannabis for recreational purposes and use for medical purposes. The present section focuses on the evidence that has become available in the State of Colorado, as it was among the first adopters of measures to allow non-medical use of cannabis in the United States. The outcomes of the legislation in terms of public health and public safety measures in Colorado are starting to emerge from the available information and are presented below, although the results have been mixed and outcomes are inconclusive. It should be pointed out that the cannabis legislation in Colorado has not been applied homogeneously across the state because the regulation allows counties and cities to opt out. Only 25 of the 64 counties in Colorado have chosen to allow some elements of recreational cannabis legislation in their jurisdictions.

The present section also provides a brief update on the status of implementation of cannabis regulation

11 EMCDDA and European School Survey Project on Alcohol and Other Drugs, *ESPAD Report 2015: Results from the European School Survey Project on Alcohol and Other Drugs* (Luxembourg, Publication Office of the European Union, 2016).

12 In this section, the terms "non-medical use" and "recreational use" of cannabis have been used interchangeably.

13 Home cultivation is not allowed in the State of Washington. The number of plants allowed in each state varies.

14 National Conference of State Legislatures (www.ncsl.org).

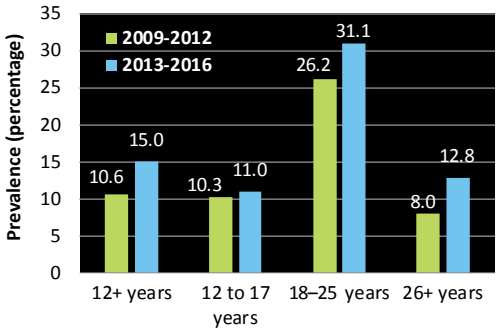
in Uruguay, where cannabis regulation is being implemented gradually, and only limited information is available on the outcomes.

Extent of cannabis use in Colorado

In 2016, Colorado was among the states with the highest annual and past-month prevalence of cannabis use in the United States. Annual and past-month prevalence of cannabis use in 2016 were, respectively, 13.7 and 8.6 per cent per cent at the national level, whereas they were 23.1 per cent and 15.9 per cent in Colorado. Since past-month use of any substance indicates the extent of more recent use, data on past-month use of cannabis have been used to present the trends in cannabis use in Colorado. According to the National Survey on Drug Use and Health, with the exception of 2015–2016, prevalence of past-month cannabis use in Colorado has increased every year since 2009–2010. While the comparison of the periods prior to legalization (2009–2012) and after legalization (2013–2016) is not enough in itself to evaluate the impact of the new regulation, the past-month prevalence of cannabis use mainly increased among people aged 18–25 years and 26 years and older. Among the population aged 26 years and older, past-month cannabis use increased by more than half while it increased by 18 per cent among young adults aged 18–25 years from one period to the other.

Different surveys at both the national and state levels provide information on alcohol and drug use among high school students. There are three main national surveys and those conducted by single state authorities. The National Survey on Drug Use and Health reports data on the extent of drug use among the population aged 12–17 years at national and state levels. The Monitoring the Future survey presents national level results for eighth, tenth and twelfth grade students, but the sample size remains relatively small for yielding valid state-level results. The Centers for Disease Control and Prevention conduct the Youth Risk Behaviors Survey, which also looks at substance use among high school students, although the state-level participation in the survey is not consistent every year. In 2015, the latest year for which Youth Risk Behaviors Survey results are reported, weighted data for Colorado fell short of the required 60 per cent response rate to generate state-level

FIG. 10 Past-month use of cannabis in Colorado prior to and following legalization of non-medical use of cannabis, by age group, 2009–2012 and 2013–2016



Source: UNODC elaboration based on results from the national survey on drug use and health: state-level estimates (SAMHSA) for 2009–2010 to 2011–2012 and from 2013–2014 to 2015–2016.

representative data.[15] Among state-specific surveys, Colorado has conducted the Healthy Kids Colorado Survey, for which the latest results available are for 2015. As the sample size and methodology of those national and state surveys differ, they have yielded different results as to whether there has been an increase in youth cannabis use in Colorado. This has become a cause of significant debate in Colorado and the United States as a whole.

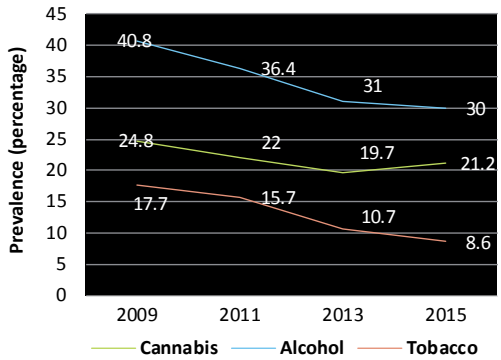
The National Survey on Drug Use and Health and the Colorado Healthy Kids Survey both show that past-month cannabis use among high school students has remained rather stable since the legalization of cannabis use. On average, past-month cannabis use among young people aged 12–17 years remained relatively stable, at between 10 and 11 per cent, over the periods 2009–2012 and 2013–2016. While they should be interpreted with caution, trends in past-month cannabis use reported in the Colorado Healthy Kids Survey generally follow those seen in the past-month use of alcohol and tobacco, although the past-month use of cannabis among high school students increased slightly in the survey years 2013 and 2015.

Public health outcomes

One public health measure used for looking at the possible adverse effects of cannabis use is emergency room visits and hospitalization related to cannabis

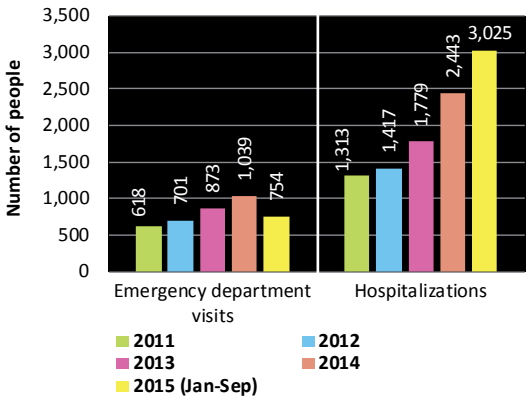
15 Centers for Disease Control and Prevention, "YRBS participation maps and history". Available at www.cdc.gov.

FIG. 11 Trends in alcohol, tobacco and cannabis use in the past month among high school students (grades 9 to 12) in Colorado



Source: Healthy Kids Colorado Survey, 2015.

FIG. 12 Health-care utilization related to cannabis use in Colorado



Source: Colorado Department of Public Health and Environment, (Denver, United States, 2017).

Note: The 2015 data on emergency department visits and hospitalizations that are publicly available are for the period January–September only.

use, especially due to acute intoxication. People suffering from acute intoxication from cannabis use may present themselves in emergency departments with anxiety, panic attacks, public intoxication, vomiting and other non-specific symptoms that could be precipitated by cannabis use.[16] It is difficult to fully quantify a trend in health-care utilization as cannabis use could be a causal, contributing or co-existing factor depending on how it was noted by the physician on duty.[17]

In the period 2013–2014, the total number of emergency department visits related to cannabis use increased by 20 per cent. Since only partial data for health-care utilization is available for 2015, it is difficult to ascertain the trend beyond 2014 in emergency department visits related to cannabis use. Nevertheless, as reported by the Colorado Department of Public Health and Environment, hospitalizations attributed to cannabis use increased significantly each year up to September 2015.[18] The number of people in treatment for cannabis as the primary substance of abuse was reported as 6,120 in 2016, a figure that had remained stable overall since 2012.

The number of calls to the poison and drug centre in Colorado in the years subsequent to the introduction of medical cannabis in 2010 and measures allowing the non-medical use of cannabis in 2013 also increased significantly. Over the period 2013–2014, calls about cannabis exposure increased by 75 per cent and remained relatively stable from 2014 to 2016.[19] While the overall numbers are small, one important health outcome reported with respect to emergency room visits data is the increasing number of children admitted due to unintentional ingestion of edible cannabis products. Over the period 2013–2016, an average of 37 cannabis exposure cases among children aged 5 years or younger were reported by the poison and drug centre in Colorado, compared with 13 cases over the prior period 2009–2012.[20] Over the period 2014–2015, the rate of cannabis-related hospitalizations among children aged 9 years and under was 14 per 100,00 population, and the rate of cannabis-related emergency department visits was 9 per 100,000 population. Those rates over the prior

16 Andrew A. Monte, Richard D. Zane and Kennon J. Heard, "The implications of marijuana legalization in Colorado", *JAMA*, vol. 313, No. 3 (20 January 2015), pp. 241–242.

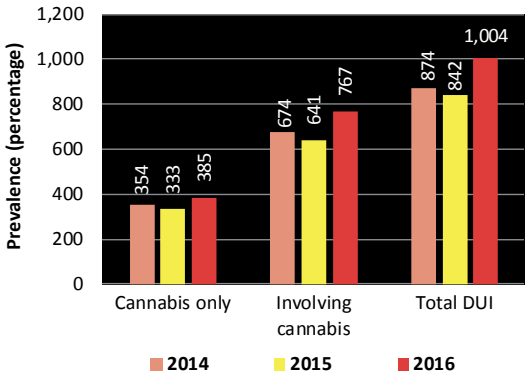
17 Ibid.

18 Colorado Department of Public Health and Environment, *Monitoring Health Concerns Related to Marijuana in Colorado: 2016* (Denver, United States, 2017).

19 Based on information of the Rocky Mountain Poison and Drug Centre, as reported in Santhi Chilukri, "The impact of recreational marijuana legalization on Colorado policy analysis on Amendment 64", Master's thesis, University of Kentucky, 2017.

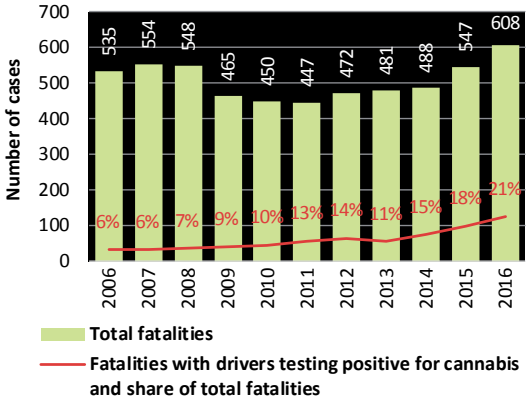
20 Rocky Mountain High Intensity Drug Trafficking Area, *The Legalization of Marijuana in Colorado: The Impact*, vol. 5 (October 2017).

FIG. 13 Driving under the influence of drugs in Colorado



Source: Data from the Colorado State Patrol, as reported through Rocky Mountain High Intensity Drug Trafficking Area, vol. 5 (October 2017).

FIG. 14 Traffic deaths with one driver testing positive for cannabis in Colorado, United States



Source: Rocky Mountain High Intensity Drug Trafficking Area, vol. 5 (October 2017).

period 2010–2013 had been, respectively, 6 and 8 per 100,000 population.[21]

Public safety and criminal justice

Driving under the influence of drugs can pose a threat not only to the driver but also to other people in a vehicle or at the roadside. Driving under the influence of cannabis was not tracked in Colorado prior to 2014. Between 2014 and 2016, the data show an increase in the number of cases of driving under the influence of cannabis only, and in the number of cases where cannabis and other substances were involved.

According to data on traffic fatalities, in Colorado there has been a steady year-on-year increase in the number of traffic deaths in which a driver tested positive for cannabis use. On average, in the period 2009–2012, there were 53 traffic deaths in which the driver tested positive for cannabis, a figure that increased to an average of 88 such deaths in the period 2013–2016, although the proportion actually doubled over that period.

In 2016, 163 investigations by Colorado Bureau of Investigations of individuals and organizations involved in the illegal sale of cannabis within and outside the State of Colorado were completed and approximately 3.5 tons of cannabis were seized.[22] Such seizures are considered to have increased by 50 per cent since 2013, when the non-medical use of cannabis was legalized in Colorado. There was also a fivefold increase in the number of parcels containing cannabis that were mailed from Colorado to other states. Since the legalization of cannabis, as reported by the Colorado Bureau of Investigation, there has been an increase in both property and violent crimes in the state. The average number of property crimes increased by 9 per cent from the period 2009–2012 to the period 2013–2016, while the average number of violent crimes increased by 14 per cent.

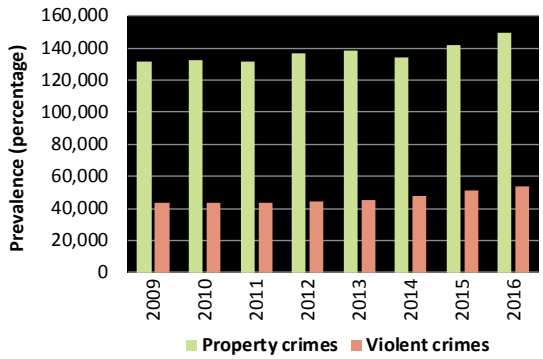
The analysis of data since 2014, when the non-medical use of cannabis was legalized in Colorado, shows that cannabis use has increased significantly among the older population while it has remained relatively stable among the younger population (12–17 years). On the other hand, there has been a significant increase in health-care visits, hospital admissions, traffic deaths and driving under the influence of cannabis in the state.[23] As noted in the *World Drug Report 2017*, evaluation of the impact of measures allowing the commercial production, sale and recreational use of cannabis on health, criminal justice and other outcomes requires regular

21 Colorado Department of Public Health and Environment, *Monitoring Health Concerns Related to Marijuana in Colorado: 2016.*

22 Rocky Mountain High Intensity Drug Trafficking Area, *The Legalization of Marijuana in Colorado: The Impact*, vol. 5 (October 2017).

23 Chilukri, "The impact of recreational marijuana legalization on Colorado policy analysis on Amendment 64".

FIG. 15 | Property and violent crimes in Colorado



Source: Colorado Bureau of Investigation as reported through Rocky Mountain High Intensity Drug Trafficking Area, , vol. 5 (October 2017).

monitoring over time, and it may take years to determine their long-term effect on cannabis use and associated harm among adults, as well as their influence on cannabis use among adolescents.

Cannabis regulation in Uruguay: provisions and recent developments

In 2013, the Government of Uruguay approved legislation (Law No. 19.172) regulating the cultivation, production, dispensing and use of cannabis for recreational purposes.[24] In accordance with Uruguayan legislation, cannabis for recreational use can be obtained via registration with the national Institute for the Regulation and Control of Cannabis by choosing one of the three options: purchase in authorized pharmacies, membership of a club or domestic cultivation.[25] The quantity of cannabis permitted per person, obtained through any of the three mechanisms, cannot exceed 480 grams per year.

Domestic cultivation

Uruguayan legislation allows domestic cultivation for personal or shared use in a household, up to a maximum of six cannabis plants per household for personal consumption. At the time that the legislation was adopted in 2013, those who had already been cultivating cannabis had a period of up to six months to register with the Institute for the Regulation and Control of Cannabis. As of the end of February 2018, 8,125 individuals had been registered for domestic cultivation, of whom 2,178 were authorized to grow cannabis in the period March 2017–February 2018. Cannabis production from domestic cultivation in that period is estimated to have reached 3,900 kg.

Cannabis clubs

Cannabis clubs are accredited as "civil associations" by the Ministry of Education and Culture and registered with the Institute for the Regulation and Control of Cannabis for the purpose of collective cultivation, production and use of cannabis among their members. Each club can have a minimum of 15 and a maximum of 45 members and is allowed 99 plants in a flowering state. Up to the end of February 2018, 78 clubs had been registered, 20 of which in the 12-month period March 2017–February 2018. At the end of February 2018, the membership of cannabis clubs stood at 2,049 adults, suggesting a maximum production of cannabis of 984 kg in 2017; 122 kg of cannabis were declared to the Institute for the Regulation and Control of Cannabis in 2016. Each club and its facilities are subject to the control of the Institute for the Regulation and Control of Cannabis

Sale through pharmacies

Adults who are registered in the system can opt to buy quantities of cannabis from pharmacies of up to 10 g per person per week or 40 g per month, provided they hold Uruguayan citizenship or permanent residency in Uruguay. Since July 2017, when the process of registering the pharmacies began, 16 pharmacies have been registered in the network of cannabis dispensing pharmacies. In the meantime, due to transaction issues with certain banks, six pharmacies have rescinded their registration, while another six are being evaluated for inclusion in the network. In order to increase the geographical coverage of cannabis dispensing outlets under the control of the Institute for the Regulation and Control of Cannabis, the Uruguayan Government is considering the evaluation and subsequent granting of licences to new commercial establishments that will sell cannabis to registered users. The cannabis price is evaluated every six months and was raised by 6 per cent in February 2018 to 200 pesos per 5 g package

24 The main elements of regulation are given in table 1 and 2 in Annex C. Cannabis.

25 The information in this section is taken from the Institute for the Regulation and Control of Cannabis.

(approximately $1.40 per gram). Between July 2017 and February 2018, 20,900 individuals were registered to obtain cannabis through pharmacies. Some 150,000 transactions have been made to date.

Limits on tetrahydrocannabinol and cannabidiol content

The cannabis varieties distributed by the Institute for the Regulation and Control of Cannabis allow a minimum of 3 per cent of the cannabidiol content and maximum of 9 per cent the tetrahydrocannabinol content.

Limited scale of legal supply to date

As of February 2018, in Uruguay 8,125 individuals and 78 cannabis clubs with a total of 2,049 members were registered in addition to the 20,900 people registered through pharmacy sales for cannabis. The system potentially provides cannabis to around 30,000 of the 140,000 past-month cannabis users estimated in Uruguay in 2014. The impact of the provisions regulating the non-medical use of cannabis in Uruguay will only become evident, however, in the coming years once more information on the outcome measures related to public health and public safety is made available.

TABLE 1 | Regulations for legalizing the use of cannabis within jurisdictions in the United States of America

	Alaska	California	Colorado	District of Columbia	Maine
Legal Process	Voter initiative, state statute	Voter initiative	Voter initiative, amendment to state constitution	Voter initiative	Voter initiative
Title	Ballot Measure 2	Proposition 64	Amendment 64	Initiative 71	Question 1
Date passed	November 2014	November 2016	November 2012	November 2014	November 2016
Date implemented/ required date of rule adoption	February 2015: Personal possession, consumption, cultivation October 2016: Retail sales	Not stated, but licences to be issued by 11 January 2018	December 2012: Personal possession, consumption, cultivation January 2014: Retail sales	February 2015: Personal possession, consumption, cultivation	Take effect on 7 January 2017; regulation for business to be in place August 2017
Regulatory authority	Marijuana Control Board (Alcoholic Beverage Control Board)	Bureau of Marijuana Control	Marijuana Enforcement Division (Department of Revenue)	Not applicable; considering separate legislation to regulate commercial production and sale to adults	Department of Agriculture, Conservation and Forestry
Minimum age	21	21	21	21	21
Residency requirement	None	Not specified	None	None	Not specified
Personal possession quantity	28.5 g	1 oz flower 8 g concentrate	28.5 g	57 g	2.5 oz (70.8 g) 5g concentrate
Home cultivation	Six plants, three of which can be flowering; not subject to public views; within property with lawful possession or with consent of the person in lawful possession	Six plants, away from view	Six plants, three of which can be flowering	Six plants per person; Twelve plants per household, six of which can be flowering	Six mature plants, twelve immature plants, unlimited amount of seedlings away from view and tagged with personal identification number. Property owners can prohibit home cultivation. Cultivation for medical purposes not subject to same restrictions
Interpersonal sharing	28.5 g	Yes	28.5 g	28.5 g	Yes for home grow. Not permitted for retail marijuana
Retail transaction limit	28.5 g	Not specified, presumably same limits for personal possession	Residents: 28.5 g Non-residents: 7 g	Not applicable	2.5 oz. of marijuana Twelve seedlings
Retail pricing structure	Market	Market/commercial	Market	Market	Market/commercial
Average retail price per gram after tax	Average price $20	Low quality $10 High quality $14	Medium quality $15.5	Not applicable	Medium quality $14
Maximum THC content	Not set initially	Not set initially	Not set initially	Not set initially	Not set initially
Registration requirements	None	Not specified	None	None	Not specified

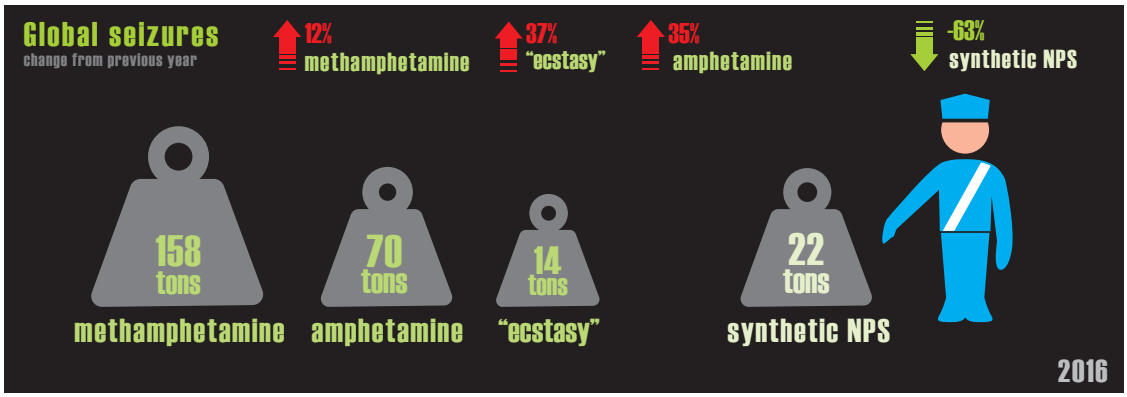
	Alaska	California	Colorado	District of Columbia	Maine
Commercial production	Licensed cannabis producers	Licensed cultivators and manufacturers, varying types	Licensed cannabis cultivation facilities	None	Licensed cultivators; two types based on size
Commercial distribution	Licensed retail cannabis stores	Limits on market concentration	Licensed retail cannabis stores	None	State authority may not limit total number of stores; localities may regulate number and location of establishments
Restrictions on edibles	5 mg of THC for single serving, no more than 50 mg of homogenous THC allowed per package. Child-resistant packaging required. Separate warnings on risks, not appealing to children	10 mg THC per serving. Warning and potency labels. List of ingredients and cannabinoid content	Maximum of 10 mg of THC in each individually packed serving; warning labels "keep out of reach of children"; THC symbol on labels and not attractive to children	Currently not allowed	Serving size and potency limits to be developed in regulations. List of ingredients packing and labels; products and edibles may not contain additives designed to make product more appealing to children
Advertising	Final advertising regulations to be determined by the Alaska Department of Health and Social Services Division of Public Health	Restricted to those over 21. Restrictions on false advertisement or claims of untrue health benefits. Products cannot appeal to children	Restricted to media with no more than 30 per cent of the audience under the age of 21	Not applicable, no commercial market	Restricted to those over 21. Restrictions on false advertisement or claims of untrue health benefits. Products cannot appeal to children
Taxation	$50 excise tax per ounce on sales or transfers from cultivation facility to retail store or product manufacturer; other parts of plant e.g., stems and leaves are taxed at $15 per ounce	15 per cent excise on retail, $9.25 per dry weight ounce on flower after harvest. $2.75 per drug weight ounces on leaves	15 per cent excise tax on cultivation; 10 per cent retail marijuana sales tax to be decreased to 8per cent in July 2017 2.9 per cent state sales tax Up to 3.5 per cent local sales taxes	Not applicable, no commercial market	10 per cent excise on retail
Cannabis clubs	Not explicitly allowed or prohibited Earlier ban on in-store consumption repealed in November 2015	Not specified though they may exists in the form of microbusiness that allow on site consumption	Not allowed	Not allowed; currently under investigation by city task force.	Allowed
Medical cannabis	1998: Patient registry, no dispensaries registration; out-of-state patients recognized for approved conditions but not for dispensary purchases; possession, home cultivation	1996 and 2003; Patient registry - voluntary registration; cooperatives and collectives; State-wide licensing of dispensaries will begin 2018	2000: Patient registry, dispensaries already existed; out-of-state patients not recognized; possession, consumption; 2010: commercial production and sales	1998/2010: Patient registry; dispensaries allowed	1999: Patient registry or identifaction card; dispensaries, recognizes patients from other states but not for dispensary purchases

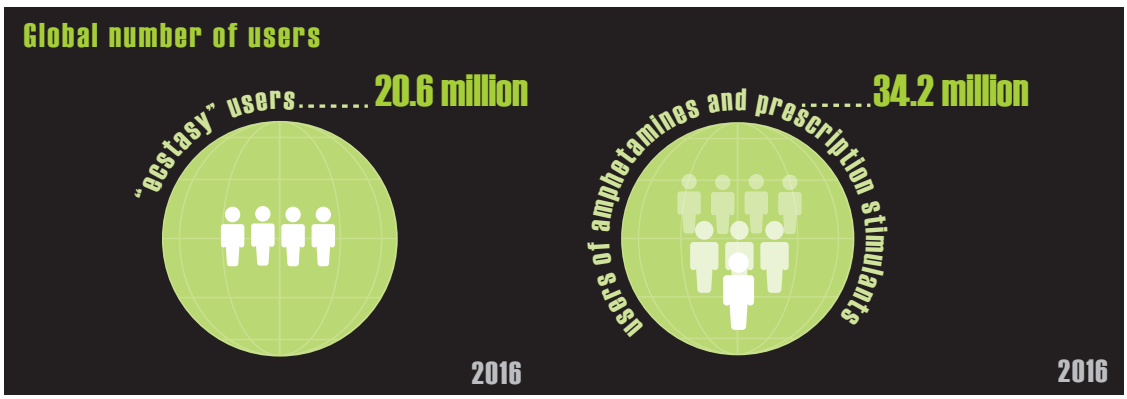
TABLE 2 | Regulations for legalizing the use of cannabis within jurisdictions in the United States of America and Uruguay (continued)

	Massachusetts	Nevada	Oregon	Washington	Uruguay
Legal Process	Voter initiative	Voter initiative	Voter initiative, state statute	Voter initiative, state statute	Government initiative, national law
Title	Question 4	Question 2	Measure 91	Initiative 502	Law No. 19.172
Date passed	November 2016	November 2016	November 2014	November 2012	December 2013
Date implemented/ required date of rule adoption	15 September 2017. Licences issued starting 1 October 2017	Takes effect on 1 January 2017 and regulations to be in place by 1 January 2018	July 2015: Personal possession, consumption, cultivation October 2015 up to December 2016: Retail sales through medical dispensaries January 2017: retail sales through licensed retailers	December 2012: Personal possession, consumption July 2014: Retail sales	August 2014: Personal cultivation October 2014: Grower clubs Mid-2017: pharmacy sales
Regulatory authority	1) Cannabis Control Commission, and 2) Cannabis Advisory Board	Department of Taxation	Oregon Liquor Control Commission	Liquor and Cannabis Board (formerly the Liquor Control Board)	Institute for the Regulation and Control of Cannabis (IRCCA)
Minimum age	21	21	21	21	18
Residency requirement	Not specified	Not specified	None	None	Uruguayan citizenship or permanent Uruguayan residency required
Personal possession quantity	1 oz. flower (28.5 g) 5g concentrate	1 oz. flower 3.5g concentrate	In public: 28.5 g At home: 228 g	28.5 g	40 g per month
Home cultivation	6 plants, 12 in a single residence away from view; 10 oz. of dried marijuana permitted at home	Six plants, no more than twelve on property in indoor or in enclosed with permission of landlord and must be 25 miles away from retail cannabis store	Four plants in flower	Not allowed	Six plants in flower
Interpersonal sharing	Yes	Yes	28.5 g	Not allowed	Allowed within the home
Retail transaction limit	Not specified, presumably same limits as for personal possession	Not specified, presumably same limits as for personal possession	7 g	28.5 g	40 g per month, 10 g per week (sale through pharmacies to registered users)
Retail pricing structure	Market/commercial	Market/commercial	Market	Market	Government price control
Average retail price per gram after tax	Medium quality $16	Medium quality $20	Medium quality $10	Medium quality $11.6	200 pesos per 5 grams (approx. $1.4 per gram)
Maximum THC content	Not set initially	Not set initially	Not set initially	Not set initially	15 per cent maximum THC content (suggested criterion not fixed by law)
Registration requirements	Personal data collection not required	Personal data collection not required	None	None	Yes, with IRCCA for any of the three modes of access

	Massachusetts	Nevada	Oregon	Washington	Uruguay
Commercial production	Licensed establishments	Licensed establishment	Licensed cannabis producers	Licensed cannabis producers	Licensed marijuana producers
Commercial distribution	Licensed establishments; localities can regulate, limit or prohibit the operation of businesses	Limits on market concentration by population	Licensed retail cannabis stores	Licensed retailers	Licensed pharmacies
Restrictions on edibles	Serving size and potency limits to be developed in regulations. List of ingredients	Not specified	Maximum of 10 mg of THC in each individually packed serving; edible products to undergo a preapproval process; not appealing to children	10 mg of THC in each individually packaged serving; child-proof packaging; THC labelling; marijuana-infused products, packages and labels be approved by the State Liquor Control Board before sale	
Advertising	Restrictions on marketing to children to be developed in regulations	Restrictions to be developed in regulations	Entry sign required on exterior of dispensaries; Oregon Liquor Control Commission has authority to further regulate or prohibit advertising	Limited to one sign for retailers at business location	Prohibited
Taxation	3.75 per cent excise on retail	15 per cent excise on retail	No tax on retail sales from October 2015 to December 2015 25 per cent sales tax after 5 January 2016 17 per cent sales tax 2017 with options for local communities to establish local tax up to 3 per cent	July 2014-June 2015: 25 per cent tax at each stage (production, processing, retail) July 2015: 37 per cent sales tax	No tax, although IRCCA can impose tax in the future.
Cannabis clubs	Not allowed although they may exist in establishments that allow on-site-consumption	Not specified	Not allowed	Not allowed	Clubs with 15-45 members allowed to cultivate up to 99 plants, maximum 480 g of dried product per member per year
Medical cannabis	2012/2013; patient registry or identification cards; dispensaries, out-of-state patients not recognized	2000: Patient registry or identification card, No dispensaries; recognize out of state patients if other state's programmes are substantially similar; patients must fill out Nevada paper work	1998: Patient registry, dispensaries already existed but not clearly authorized by law or regulated; possession, home cultivation	1999/2010/2011; no registration or identification card; dispensaries approved as of November 2012, first stores opened in July 2014: 1999 possession 2012: Home cultivation	2014: Passed, but not yet effective

D. SYNTHETIC DRUGS





The present chapter contains a brief overview of a segment of the drug market that has grown in complexity in recent years. It encompasses both amphetamine-type stimulants (ATS), such as amphetamine, methamphetamine and "ecstasy", and new psychoactive substances (NPS).

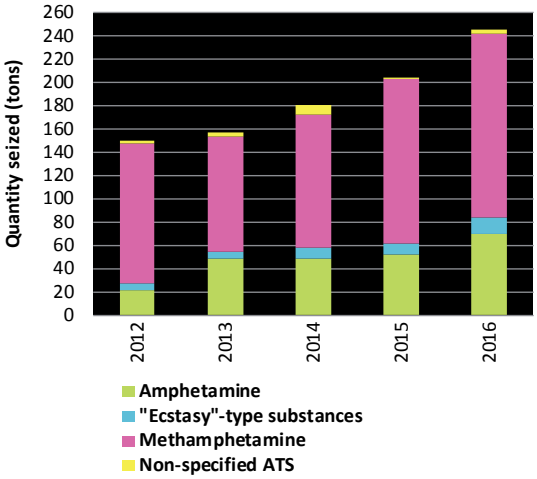
Amphetamine-type stimulants

The global market for ATS is characterized by a combination of ongoing trends and new challenges. The persistence of methamphetamine, as reflected in seizure, manufacturing and use statistics, continues, particularly in North America and East and South-East Asia, where crystalline methamphetamine is a growing concern. There continues to be a large market for "ecstasy" in Australia and New Zealand, while Western and Central Europe remain a trafficking hub for the substance. Recently, other new developments have been observed: synthetic drug markets have developed in South Asia, and there are indications that amphetamine trafficking and use may be expanding beyond established markets in the Near and Middle East/South-West Asia to countries in North Africa.

Significant increase in the quantity of amphetamine-type stimulants seized globally

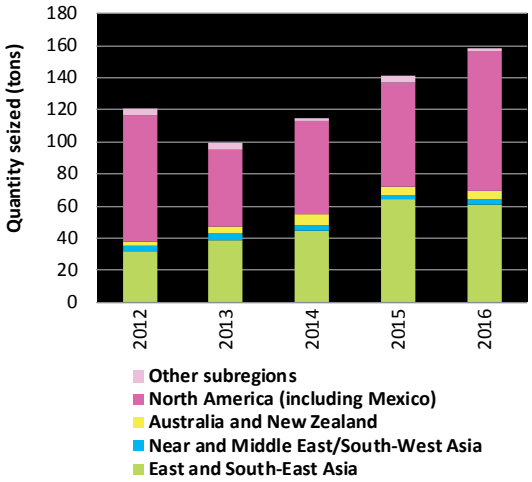
Seizures of all types of ATS have risen since 2015. The global quantity of ATS seized in 2016 increased by a fifth from the previous year, rising from 205 tons to 247 tons. Methamphetamine continues to account for the largest share of global quantities of ATS seized. In keeping with the upward trend in global methamphetamine seizures over the past few years, seizures continued to increase in 2016, to more than 158 tons. The global quantity of "ecstasy" seized almost tripled from 2012 to 2016, reaching 14 tons, and the global quantity of amphetamine seized also increased in 2016, to 70 tons, having remained at the 50-ton mark in the previous three years.

FIG. 1 Quantities of amphetamine-type stimulants seized worldwide, by type, 2012–2016



Source: UNODC, responses to the annual report questionnaire, 2012–2016.

FIG. 2 Quantities of methamphetamine seized worldwide, by subregion, 2012–2016



Source: UNODC, responses to the annual report questionnaire, 2011–2016.

Rise in global methamphetamine seizures continues

In 2016, the global quantity of methamphetamine seized increased for a fourth consecutive year. That year, 87 tons of methamphetamine were seized in North America, almost 26 tons more than the quantity of methamphetamine reported to have been seized in East and South-East Asia in 2016. Methamphetamine seizures continued to remain stable in Australia and New Zealand in 2016. It seems reasonable to assume that the increase in global methamphetamine seizure quantities in recent years is not only a result of increased law enforcement activities but also, in connection with other indicators, a reflection of the dynamic and growing market for methamphetamine.

East and South-East Asia and North America: the main markets for methamphetamine

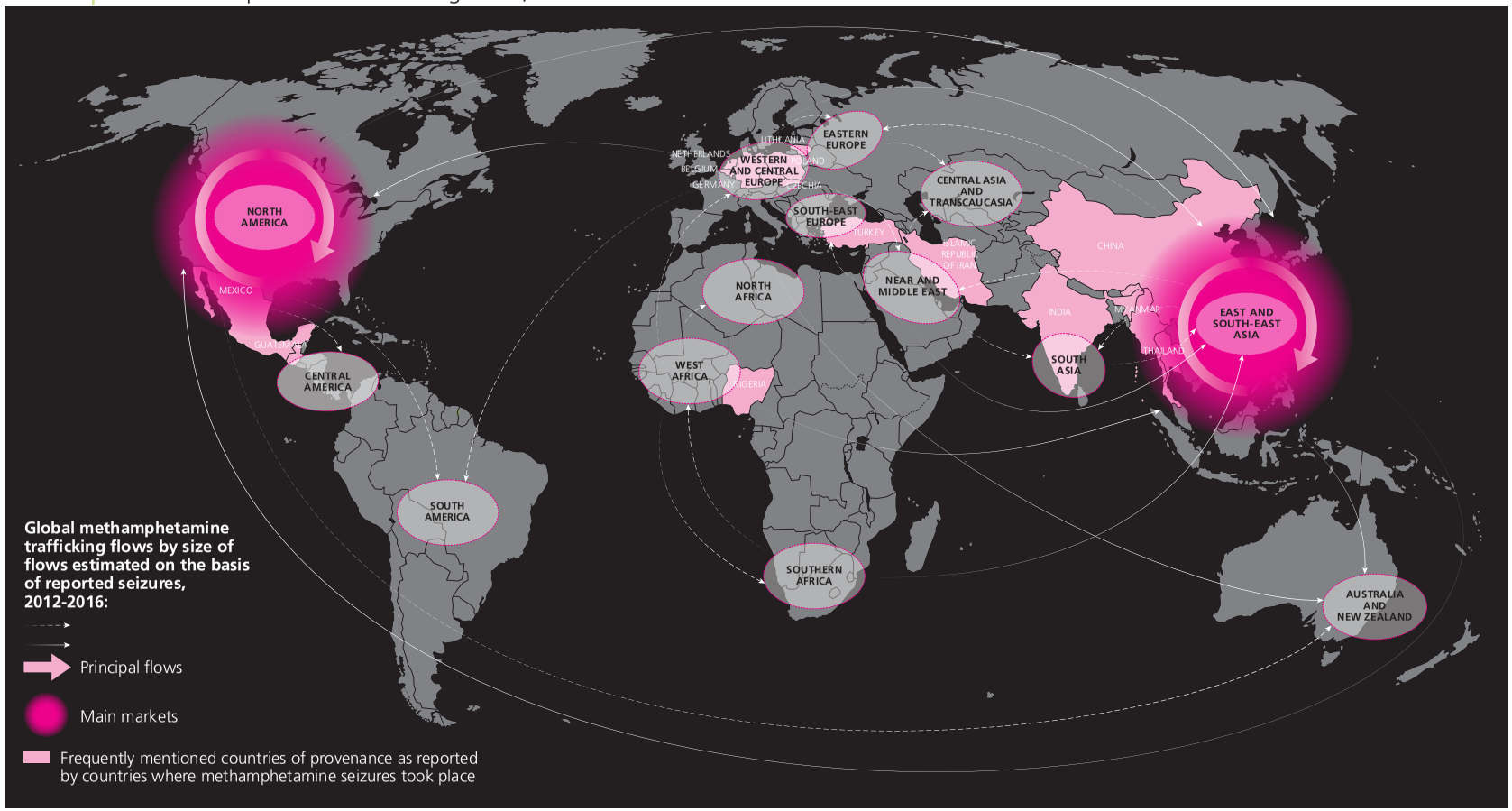
In an analysis of global trafficking flows based on seizure information, East and South-East Asia and North America emerge as the two core subregions for methamphetamine trafficking. Not only is methamphetamine trafficked extensively between countries within each of those subregions, but also most methamphetamine trafficked between regions is destined for countries in those two subregions. Additionally, a number of countries in Western and Central Europe, as well as India, Iran (Islamic Republic of), Nigeria and Turkey, have frequently been identified as the country of provenance of methamphetamine seized worldwide. Other subregions such as West, Central and Southern Africa appear to be transit areas for methamphetamine trafficking.

Crystalline methamphetamine: a growing market

Perceived increases in consumption and manufacturing capacity and increasing seizures point to a growing market for crystalline methamphetamine in North America, East and South-East Asia and Oceania. In East and South-East Asia and Oceania, methamphetamine has long been available in the form of both crystalline methamphetamine and methamphetamine tablets, but crystalline methamphetamine use has now become a key concern. Also called “crystal meth”, “ice” or “shabu”, crystalline methamphetamine is usually of much higher purity than the tablet form. Methamphetamine tablets, commonly known as “yaba” in East and South-East Asia, are small pills, typically of low purity, which in addition to methamphetamine often contain a large portion of caffeine, plus a range of adulterants.

In some countries in East and South-East Asia, health concerns relating to crystalline methamphetamine

MAP 1 | Main methamphetamine trafficking flows, 2012–2016

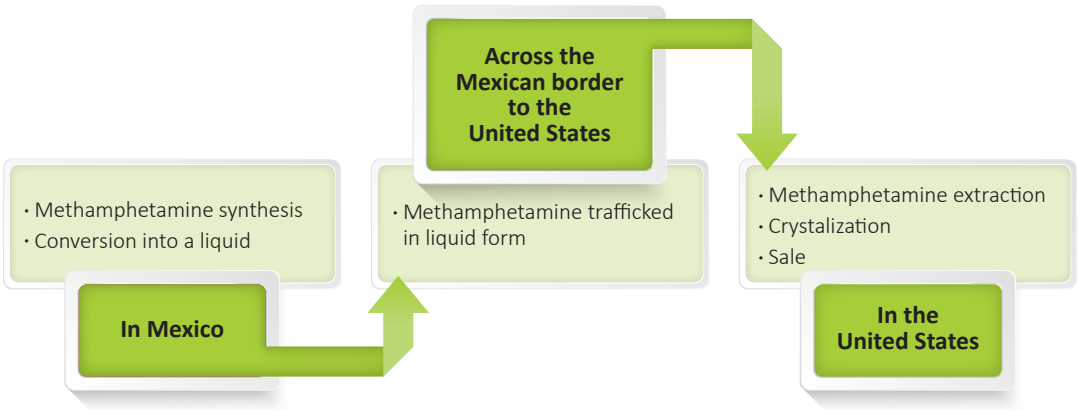


Sources: UNODC, responses to the annual report questionnaire and individual drug seizure database.

Notes: The size of the trafficking flow lines is based on the amount of methamphetamine seized in a subregion and the number of mentions of countries from where the methamphetamine has departed (including reports of "origin" and "transit") to a specific subregion over the period 2012–2016. The trafficking flows are determined on the basis of country of origin/departure, transit and destination of seized drugs as reported by Member States in the annual report questionnaire and individual drug seizure database: as such, they need to be considered as broadly indicative of existing trafficking routes while several secondary flows may not be reflected. Flow arrows represent the direction of trafficking: origins of the arrows indicate either the area of manufacture or the one of last provenance, end points of arrows indicate either the area of consumption or the one of next destination of trafficking.

The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations. Dashed lines represent undetermined boundaries. The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. The final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

FIG. 3 | A reported strategy for trafficking methamphetamine from Mexico to the United States



Source: Diagram based on information reported by United States Drug Enforcement Administration, 2017 National Drug Threat Assessment (October 2017).

use are supported by treatment data. In Malaysia, for example, crystalline methamphetamine users accounted for 20 per cent of people receiving treatment for drug use, whereas in Brunei Darussalam, crystalline methamphetamine users accounted for almost all people (94 per cent) in treatment for drug use in 2015.[1]

Until recently, most crystalline methamphetamine seizures reported worldwide were in East and South-East Asia. After remaining stable for several years, crystalline methamphetamine seizures in East and South-East Asia almost tripled from 2013 to 2016, reaching 30 tons.[2] Overall, methamphetamine seizures have also increased significantly in the United States of America, from 30 tons in 2013 to 52 tons in 2016.

In North America, a trafficking strategy often employed by organized criminal networks to facilitate the concealment of shipments is to traffick methamphetamine in powder or liquid form from Mexico to the United States, where the substances are then converted to crystalline methamphetamine in so-called "conversion laboratories". Although the United States Drug Enforcement Administration reported that most of the conversion laboratories seized in the country in 2016 were located in California and other south-western states close to the Mexican border, conversion laboratories were also seized in Georgia, Kansas, Nevada, North Carolina and Oklahoma.[3] In 2013, more than 3 tons of liquid methamphetamine were reported to have been seized in Mexico.

Methamphetamine was perceived to be the second greatest drug threat in the United States after heroin in 2016, and its availability, as reported by law enforcement agencies in the country, increased between 2013 and 2016.[4]

Western and Central Europe: an international trafficking hub for "ecstasy"

The established markets for "ecstasy" have traditionally been in Europe, North America and Oceania, with large quantities of the drug being seized over the years. Data on dismantled facilities manufacturing "ecstasy", together with seizure statistics, suggest that Western and Central Europe has remained an international hub for the manufacture and trafficking of "ecstasy". According to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) and the European Union Agency for Law Enforcement Cooperation (Europol), Belgium and the Netherlands are key countries for the manufacture of 3,4-methylenedioxymethamphetamine (MDMA) in Europe.[5] Seizures of "ecstasy"

1 Drug Abuse Information Network for Asia and the Pacific.

2 Drug Abuse Information Network for Asia and the Pacific.

3 United States, *Drug Enforcement Administration, 2017 National Drug Threat Assessment* (October 2017).

4 Ibid., *2016 National Drug Threat Assessment Summary* (November 2016).

5 EMCDDA and European Union Agency for Law Enforce-

originating in Western and Central Europe have frequently been reported by countries in the Americas, East and South-East Asia and Oceania. Recent surveys also indicate an overall increase in the use of "ecstasy" in Europe.[6]

After 2005, the global "ecstasy" market went through a change triggered by a shortage of MDMA. As demand for "ecstasy" continued unchanged despite the shortage, traffickers turned to other chemicals as an alternative to MDMA in order to satisfy the existing market.[7] However, following a period in which products sold as "ecstasy" contained little or no MDMA, "ecstasy" tablets containing high doses of MDMA have reappeared on the synthetic drug market. Although in Europe "ecstasy" is mainly available in tablet form, "ecstasy" in the form of powder or crystalline MDMA has also emerged in some European countries.[8]

High levels of "ecstasy" use continue to be reported in Oceania, and estimated past-year prevalence rates for "ecstasy" use in the region are among the highest in the world. Perceived increases in the use of "ecstasy" were reported in New Zealand in 2016, whereas in Australia the reported past-year use of "ecstasy"[9] among the population aged 14 and older decreased from 2.5 per cent in 2013 to 2.2 per cent in 2016.[10] Although "ecstasy" seizures in New Zealand have remained below 50 kg annually, seizures have increased significantly in Australia, to around 5 tons in 2016 from less than 1 ton in the previous year. Trafficking and manufacturing data suggest that the "ecstasy" consumed in the region is sourced through a combination of domestic manufacture and international supply networks. For instance, in 2015 and 2016 a total of 17 laboratories manufacturing MDMA were reported to have been detected in Australia, and another 18 were detected in 2014 and 2015. New Zealand last reported the discovery of two MDMA manufacturing laboratories in 2013.

New developments: amphetamine spreads to North Africa and North America

For many years, amphetamine dominated synthetic drug markets in the Near and Middle East and Western and Central Europe, but recent reports of increasing quantities being seized in North Africa and North America point to the growing activity in other subregions. While the reasons for a spike in the quantity of amphetamine seized in North Africa are not entirely clear, it may be related to the trafficking of amphetamine destined for the large market in the neighbouring subregion of the Near and Middle East. The large quantities of amphetamine seized in North America could be due to an expansion of domestic manufacture.

Taken together, seizure data, information on trafficking and expert perceptions reported by Member States on use trends point to a growing amphetamine market in the Near and Middle East. Expert perceptions in the Near and Middle East reveal a picture of mixed trends on amphetamine use, as some countries have reported increases in use for several years, while others have reported trends of stable or decreasing use. The only countries in the subregion where expert perceptions have consistently suggested an increase in amphetamine use are the Syrian Arab Republic (2013–2015) and Jordan (2014–2016). Although aggregate treatment data for amphetamine are not available for countries in the Near and Middle East, treatment data for Jordan show that people treated for ATS use were the second largest group of people treated for drug use in the country in 2015, after cannabis.

Quantities of amphetamine seized in the subregion of the Near and Middle East/South-West Asia more than doubled, from 20 tons in 2015 to 46 tons in 2016, and accounted for 65 per cent of amphetamine seizures worldwide in 2016. About 39 per cent of reported amphetamine seizures in that subregion, totalling 18 tons, were in Saudi Arabia. A further 14 tons of amphetamine were seized in Jordan that

ment Cooperation (Europol), *EU Drug Markets Report: In-Depth Analysis*, Joint Publications Series (Luxembourg, Publications Office of the European Union, 2016).

6 EMCDDA, *European Drug Report: Trends and Developments 2016* (Luxembourg, Publications Office of the European Union, 2016).

7 United Nations Office on Drugs and Crime (UNODC), "Understanding the synthetic drug market: the NPS factor", Global SMART Update, vol. 19 (March 2018).

8 Claudio Vidal Giné and others, "Crystals and tablets in the Spanish ecstasy market 2000–2014: are they the same or different in terms of purity and adulteration?" *Forensic Science International,* vol. 263 (2016), pp. 164–168.

9 "Ecstasy" tablets sold as ecstasy in Australia may contain substances other than MDMA.

10 Australian Institute of Health and Welfare, *National Drug Strategy Household Survey 2016: Detailed Findings*, chap. 5, 28 September 2017. Available at www.aihw.gov.au/reports/illicit-use-of-drugs/2016-ndshs-detailed/data.

South Asia: an emerging synthetic drug threat

There are strong indications that synthetic drug trafficking is expanding in South Asia. For example, although quantities of synthetic drugs seized have remained at low levels in India for a number of years, large quantities were reported in 2016, with seizures of 24 tons of methaqualone and 2 tons of amphetamine. In 2016, most amphetamine seized in India was considered to have originated within the country. Most amphetamine and the smaller amounts of "ecstasy" and methamphetamine seized in India in 2016 were reported to have been destined for the domestic market. The remaining amounts seized in the country were reported to have been destined for Malaysia and to a lesser extent the Netherlands, the United Kingdom of Great Britain and Northern Ireland, and Zambia.

Although there is no information available on methaqualone trafficking in India for 2016, the 0.2 tons of methaqualone seized in that country in 2015 were reported to have been destined for countries outside South Asia, such as Malaysia, the United Republic of Tanzania and Zambia. A small number of methamphetamine laboratories were also reported to have been dismantled in India in 2011, 2014 and 2015. In 2016, the country reported the dismantling of two amphetamine laboratories and, for the first time, a mephedrone laboratory. The diversion of pharmaceutical preparations containing ephedrine or pseudoephedrine indicates the risk of illicit synthetic drug manufacture, and India reported seizures of more than 10 tons of ephedrine and 8.5 tons of pseudoephedrine in 2016.[a]

In 2015, Bangladesh reported seizures of almost 2 tons of methamphetamine tablets, which were reported to have been destined for the domestic market and trafficked from Myanmar. Previously, the country had reported the seizure of 3 tons of methamphetamine tablets in 2013.

[a] *Precursors and Chemicals Frequently Used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances: Report of the International Narcotics Control Board for 2016 on the Implementation of Article 12 of the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988* (E/INCB/2016/4).

year, and large amounts of seizures were also reported by the United Arab Emirates (6 tons), Pakistan (4 tons), Lebanon (2 tons) and the Syrian Arab Republic (1 ton). Trafficking reports show that in that subregion, amphetamine is mostly trafficked between countries within the region and, as in previous years, most of the amphetamine seized in the subregion was considered to have originated in Lebanon and the Syrian Arab Republic. Countries such as Saudi Arabia and the United Arab Emirates were the countries most frequently reported as destination countries for amphetamine seized in the subregion in 2016. However, recent seizure reports indicate that countries in North Africa and Asia are also connected to the trafficking routes in the Near and Middle East. It remains to be seen whether these new reports of amphetamine trafficking from outside the subregion indicate the development of new routes.[11]

Recently, large amounts of amphetamine seizures have been reported in North Africa, with more than 6 tons reported in Egypt in 2016 and another 2 tons in 2015, as well as another 0.5 tons reported in Sudan in 2016. Information on the domestic availability of amphetamine in those countries is not available. However, limited data on synthetic drug trafficking, taken together with the geographic proximity of the Near and Middle East, suggest that seizures in Egypt and Sudan could be the result of a growing trafficking connection between North Africa and countries in the Near and Middle East. For instance, in 2016, Egypt was reported to be the intended destination of amphetamine seized in Jordan, while amphetamine seized in the Syrian Arab Republic was reported to have been destined for the Sudan and Egypt. So far, it remains unclear whether amphetamine seizures in North African countries are the result of isolated incidents or whether they are representative of a wider trend.

Amphetamine seizures have been reported in all countries of North America, including Mexico. However, amphetamine seized in the United States accounts for the majority of amphetamine seizures in that subregion and constituted a 6 per cent share of the total quantity of amphetamine seized worldwide in 2016. In 2016, amphetamine was trafficked both into and out of the United States from countries in various subregions, including Central America, Western and Central Europe, East and South-East Asia and New Zealand. Within North

11 For a more detailed analysis of amphetamine trafficking to and from countries in the Near and Middle East, see *World Drug Report 2017*.

America, amphetamine seized in Canada and in Mexico in 2016 was also reported to have departed from the United States. Use data for the United States do not indicate a growing market for amphetamine in the country; however, the large number of amphetamine laboratories dismantled from 2011 to 2015 suggests sizeable domestic amphetamine manufacture. Data on amphetamine manufacture for 2016 are not available, but the United States reported the dismantling of several amphetamine laboratories in 2015, 1 of industrial scale, 7 of medium scale and 34 of either small or kitchen scale. In 2014, the country had reported the dismantling of 62 amphetamine laboratories, 10 of which were of industrial scale.

New psychoactive substances

Following the emergence of hundreds of new psychoactive substances (NPS), the range of psychoactive substances available on the market has probably never been greater. NPS are marketed in many different ways and forms, their use is observed among many different groups, and the patterns of their emergence and persistence show significant differences between countries and regions. The effects of some NPS on the human body are not yet fully understood: safety data regarding their toxicity are often unavailable, and their long-term side effects are not known. This situation poses additional challenges for identification, prevention, treatment and control efforts. Although the global NPS market is extremely diverse, only a few substances seem to have established markets of their own or replaced traditional drugs, but the harm caused by their use remains considerable. Some single substances have become cemented in niche markets, specifically among small and vulnerable population groups, while others have penetrated the existing established markets of controlled substances, increasing the complexity of the offer of products in the market. The global analysis of NPS in this chapter includes ketamine, which differs from other NPS in that it is widely used in human and veterinary medicine, whereas most NPS have little or no history of medical use. To ensure comparability with figures presented in previous editions of the *World Drug Report*, the analysis also includes substances that have come under international control since 2015, unless stated otherwise.

New psychoactive substances: facts and figures

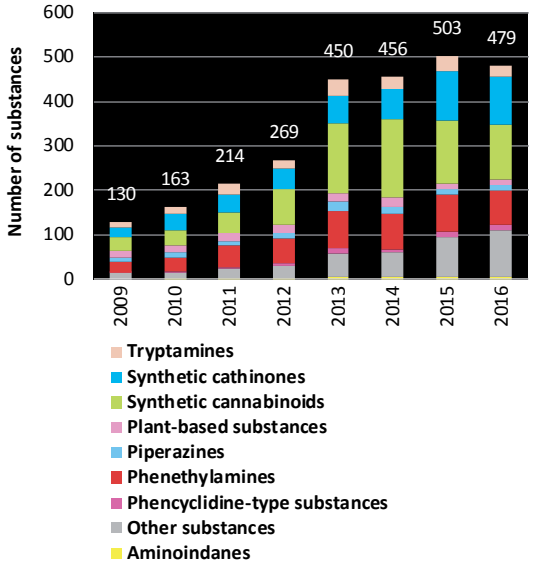
The global NPS market continues to be characterized by the emergence of large numbers of new substances belonging to diverse chemical groups. From 2009 to 2017, 111 countries and territories reported a cumulative total of 803 individual NPS.[12] Since the United Nations Office on Drugs and Crime (UNODC) began monitoring NPS in 2009, the number of NPS reported annually increased year on year until 2015, but seems to have stabilized since.

Among all NPS reported to UNODC by the end of 2017, synthetic cannabinoids constitute the largest category in terms of the number of different substances reported (251 substances), followed by the categories of "other substances" (155), synthetic cathinones (148) and phenethylamines (136). Only a comparatively small number of tryptamines, piperazines, aminoindanes and plant-based NPS are reported annually. The category of "other substances", which includes structurally diverse substances, has grown considerably, especially since 2014, totalling 155 substances by the end of 2017. This category includes NPS-derivatives of prescription medicines, including fentanyl analogues and derivatives of benzodiazepine.

Since UNODC global monitoring of NPS started in 2009, more than a quarter of the countries and territories reporting NPS have identified more than 100 different substances. At the same time, just under a quarter of all countries and territories reporting NPS have reported only one substance, which may be attributable to limited technical capacity for identifying NPS. The substances reported by the largest number of countries and territories include ketamine, khat, JWH-018, methylone, 4-methylmethcathinone, 25I-NBOMe, 5F-APINACA and AM-2201, which were each reported by at least 47 countries. With exception of ketamine and khat, all of those substances were placed under international control between 2015 and 2017.

12 UNODC, early warning advisory on new psychoactive substances, 2017. UNODC would like to thank EMCDDA, the International Narcotics Control Board and the World Customs Organization for making available information on NPS to the early warning advisory on new psychoactive substances.

FIG. 4 Number of new psychoactive substances reported annually, 2009–2016



Source: UNODC, early warning advisory on new psychoactive substances.

Emergence of new psychoactive substances: some stay, some disappear

The NPS market continues to be dynamic. New substances continue to emerge, with some establishing themselves on the market and others disappearing after a short time. In 2016, 72 NPS were reported for the first time, a much smaller number than in 2015 (137 NPS). About 70 of the 130 NPS reported at the start of UNODC global monitoring in 2009 have since been reported every year to date. While this persistence does not necessarily indicate widespread use, it suggests that some NPS seem to have established themselves on the drug market. Several of these persistent NPS were placed under international control after 2015. On the other hand, about 200 NPS reported between 2009 and 2014 were no longer reported in 2015 and 2016 and may have disappeared from the market, although this is difficult to determine given the complexity of NPS identification in many parts of the world.

4-fluoroamphetamine establishing a niche market

The stimulant 4-fluoroamphetamine (4-FA) is an example of an NPS that seems to have established itself on the drug market in some countries. In the Netherlands, from 2007 to 2009, when the availability of MDMA, the main component of "ecstasy" tablets, decreased, 4-FA was mainly sold as "amphetamine" or "ecstasy". This changed after the MDMA and amphetamine markets rebounded[13] and 4-FA established its own niche market in the Netherlands among users who reportedly preferred 4-FA over MDMA for its specific psychoactive effects.[14] The use of 4-FA reportedly produces the desired entactogenic effect, which is perceived to be less intense than that of MDMA and have a reduced tendency to cause confusion, changes in perception and dizziness. Similar to MDMA, 4-FA is typically consumed at music-related events such as festivals, dance parties, clubs and after-parties. The use of 4-FA is related to several adverse events including death, cerebral haemorrhage, myocardial infarction, acute heart failure, hypertension and tachycardia.[15] There are indications that the use of 4-FA may have increased in other European countries, such as Denmark, Germany and Spain.[16]

Most new psychoactive substances are stimulants but other effect groups are growing

Grouped by their main pharmacological effect, the largest portion of NPS reported since UNODC monitoring began are stimulants, followed by synthetic cannabinoid receptor agonists and classic hallucinogens. Smaller effect groups such as opioids,

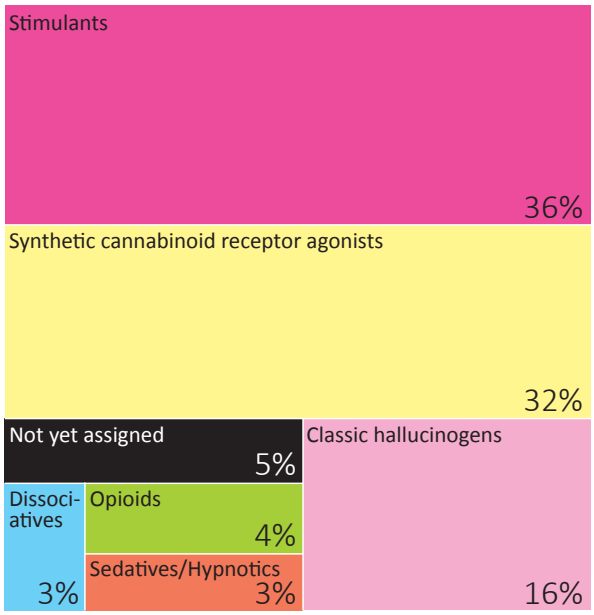
13 *World Drug Report 2017*: Market Analysis of Synthetic Drugs—Amphetamine-type Stimulants, New Psychoactive Substances (United Nations publication, Sales No. E.17.XI.10).

14 Felix Linsen and others, "4-Fluoroamphetamine in the Netherlands: more than a one-night stand", *Addiction*, vol. 110, Nr. 7 (2015).

15 Laura Hondebrink and others, "Fatalities, cerebral hemorrhage, and severe cardiovascular toxicity after exposure to the new psychoactive substance 4-fluoroamphetamine: a prospective cohort study", *Annals of Emergency Medicine*, vol. 71, No. 3 (2018).

16 Claudio Vidal Giné, Iván Fornís Espinosa and Mireia Ventura Vilamala, "New psychoactive substances as adulterants of controlled drugs. A worrying phenomenon?" *Drug Testing and Analysis*, vol. 6, Nos. 7 and 8 (2014); Sys Stybe Johansen and Tina Maria Hansen, "Isomers of fluoroamphetamines detected in forensic cases in Denmark", *International Journal of Legal Medicine*, vol. 126, No. 4 (2012); J. Röhrich and others, "Detection of the synthetic drug 4-fluoroamphetamine (4-FA) in serum and urine", *Forensic Science International*, vol. 215, Nos.1-3 (2012).

FIG. 5 Proportion of new psychoactive substances, by psychoactive effect group, December 2017



Source: UNODC, early warning advisory on new psychoactive substances.

Note: The analysis of the pharmacological effects comprises NPS registered up to December 2017. Plant-based substances were excluded from the analysis as they usually contain a large number of different substances, some of which may not have been known and whose effects and interactions are not fully understood.

dissociatives and sedatives/hypnotics have grown over the past few years, in proportional terms, at the expense of synthetic cannabinoids and classic hallucinogens. The number of NPS in each group and their growth does not necessarily indicate their scope of use and/or magnitude of threat to public health. This is demonstrated by NPS with opioid effects, which, albeit small in number, have been associated with a growing number of often fatal overdose events in recent years.[17]

Decreasing quantities of synthetic new psychoactive substances seized

Analysing trends in synthetic NPS seizures by looking at aggregate quantities seized, for example, is challenging because of the many different forms in which they appear. Five grams of an NPS may constitute less than 10 doses or several tens of thousands of doses, depending on whether the seized material consists of an NPS sprayed on herbal material or of an NPS in the form of a powder of high purity with potent effects even at the microgram level. Analysis of NPS seizures is also limited by the fact that most substances are not under national or international control and therefore may not be seized and/or reported systematically to UNODC. Quantities of NPS seized may also not reflect their availability, since detecting them represents a challenge to law enforcement authorities, one reason being that international trafficking mostly occurs in small quantities and via postal mail.

As seizures of ketamine, as well as of khat and kratom, are discussed later in this chapter, the analysis below focuses on synthetic NPS other than ketamine and plant-based substances.

Quantities of synthetic cannabinoids have dominated global seizures of synthetic NPS since 2012. The number of countries reporting seizures of synthetic cannabinoids has been relatively stable, but the quantities reported have declined sharply since 2014. However, in 2016, large quantities of synthetic cannabinoids were seized by the United States (5 tons), the Russian Federation (0.7 tons) and Turkey (0.6 tons).

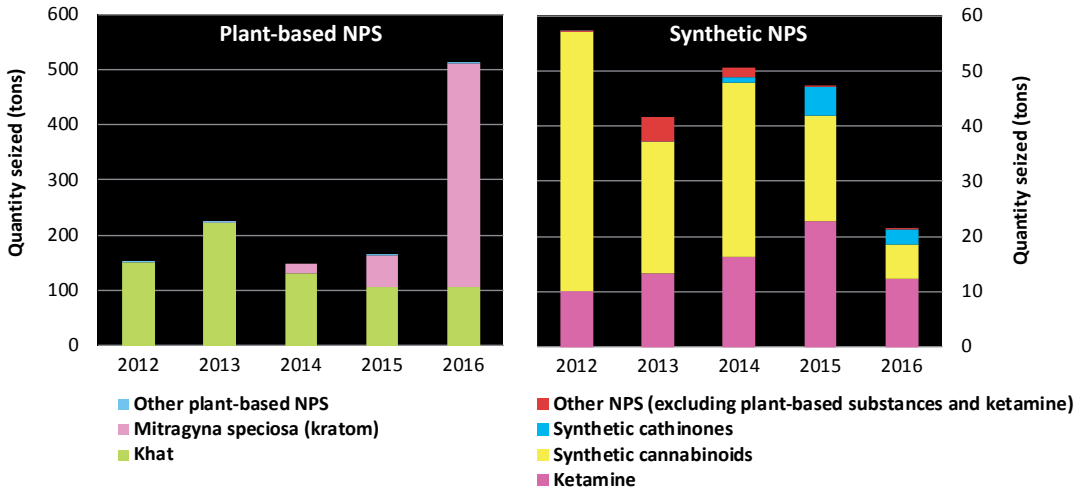
In terms of synthetic cathinones, the number of countries and territories reporting seizures and the quantities seized have actually increased, and synthetic cathinones constituted 30 per cent of global seizures of synthetic NPS (excluding ketamine) by weight in 2016. The Russian Federation (2 tons), Hong Kong, China (0.2 tons) and Belgium (0.1 tons), in particular, reported large quantities of synthetic cathinone seizures in 2016.

The analysis of NPS seizure data across countries is complex due to the large number of different substances involved and the variety of NPS products available, which often contain more than one psychoactive substance. According to 2014–2015 seizure data submitted to UNODC by seven Member States,[18] the type of NPS seized varied greatly from one year to another. Among NPS seized, the proportion of substances that were seized in both years analysed (2014 and 2015) ranged from

17 For more information on this topic, see booklet 2 of the present report.

18 UNODC, responses to the 2016 questionnaire on new psychoactive substances submitted by Australia, Belgium, Estonia, Finland, Sweden, Turkey and the United Kingdom. The reporting years for seizures were 2014 and 2015.

FIG. 6 | Annual quantities of new psychoactive substances seized globally, 2012 to 2016



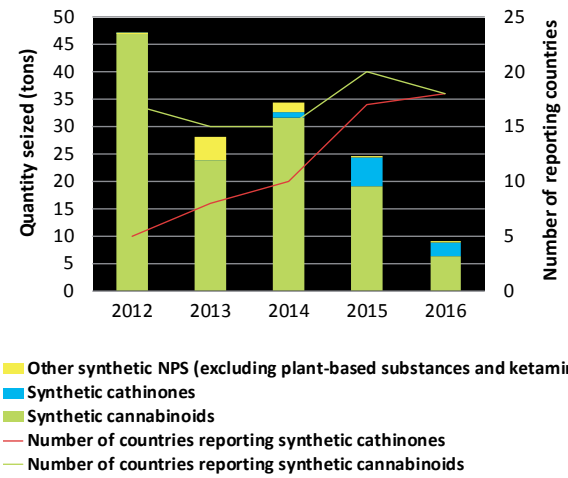
Source: UNODC, responses to the annual report questionnaire, 2012–2016.
Note: Figures include ketamine and plant-based NPS.

a low 12 to 27 per cent per country. That rather small overlap of similar substances from one year to the next highlights the highly dynamic market and underscores the challenges that law enforcement agencies, border control and customs authorities are facing. While in some countries, almost half of all NPS seizure cases in the period 2014–2015 concerned substances that were placed under international control in 2015, in other countries the proportion of such substances was as low as 6 per cent. This reflects the heterogeneity of the NPS market and the challenge of identifying a set of NPS that are of general international concern.

Trends in the use of new psychoactive substances

The comparison of epidemiological data on the use of NPS in different countries is not easy because the definition of NPS may differ from country to country and may include substances that have been placed under national or international control. There are limited data available to make comparisons of the prevalence of NPS use over time and limited survey tools for capturing NPS use, and NPS users have limited knowledge about the substances they use. The information on the use of NPS presented in this chapter should be read as an update of the more detailed analysis contained in the *Global Synthetic Drugs Assessment 2017*.[19]

FIG. 7 | Annual quantities of synthetic new psychoactive substances (excluding ketamine) seized globally and number of countries reporting seizures of synthetic cannabinoids or cathinones, 2012–2016



Source: UNODC, responses to the annual report questionnaire, 2012–2016.

Although data on trends in NPS use are still limited to very few countries, in the past three years there seems to have been a shift away from herbal smoking mixtures and an increase in the use of NPS in

19 UNODC, *Global Synthetic Drugs Assessment: Amphetamine-type Stimulants and New Psychoactive Substances* (Vienna, 2017).

New trends in the use of kratom

The leaves of the kratom tree *(Mitragyna speciosa)*, an indigenous plant found in South-East Asia, contain mitragynine, which produces a range of dose-dependent psychoactive effects. Low doses may have stimulant effects, whereas higher doses may result in sedative, dysphoric and euphoric effects.[a] Kratom has been widely used in a traditional context in South-East Asia: for example, as a herbal remedy for diarrhoea, fatigue and pain. However, it has also been utilized for non-medical purposes.[b] In recent years, kratom has gained popularity in countries in North America and Europe as a plant-based NPS. At the global level, 31 countries reported the detection of kratom between 2012 and 2017.[c]

An increasing number of reports in the scientific literature associate the use of high doses of kratom with adverse health events, including tachycardia, seizures and liver damage. In addition, regular use of the substance may cause dependence, while discontinuing its use can cause the development of withdrawal symptoms.[d] In North America in particular, a variety of products have been marketed as kratom, which may actually contain kratom in combination with other, often unknown, substances. The severe adverse health events associated with the use of such products could be related to differences in dosages of the powdered, refined form of kratom rather than in the traditional forms of use in South-East Asia.[e] In North America, the use of kratom products has been reported in the context of self-management of opioid withdrawal symptoms in small-scale studies in the United States.[d] The reportedly increasing popularity of kratom products may also be related to its wide availability: its sale is not controlled in many countries, it can be easily obtained through online shops and, compared with opioid-replacement therapies, its price is low.[f] In the United States, 44 deaths have been associated with the use of products containing kratom in polydrug use. The United States Food and Drug Administration issued a warning against the consumption of kratom over concerns about the potential risk of abuse and dependence.[g] The role of kratom products in drug overdose cases, including fatalities, is still not fully understood.

Currently, neither kratom nor the psychoactive substances contained in its leaves are under international control. Given the scarcity of data on the potential pharmacological, therapeutic and toxicological effects of kratom and kratom products, and the lack of controlled laboratory studies, it is difficult to understand the health risks and potential benefits associated with their use.[d]

a Walter C. Prozialeck, Jateen K. Jivan, and Shridhar V. Andurkar. "Pharmacology of kratom: an emerging botanical agent with stimulant, analgesic and opioid-like effects", *Journal of the American Osteopathic Association*, vol. 112, No. 12 (2012), pp. 792–799; Zurina Hassan and others, "From kratom to mitragynine and its derivatives: physiological and behavioural effects related to use, abuse and addiction", *Neuroscience and Biobehavioral Reviews*, vol. 37, No. 2 (2013), pp. 138–151.

b *World Drug Report 2013* (United Nations publication, Sales No. E.13.XI.6).

c UNODC early warning advisory on NPS; EMCDDA, "Kratom *(Mitragyna speciosa)* drug profile" (www.emcdda.europa.eu/publications/drug-profiles/kratom).

d Walter C. Prozialeck, "Update on the pharmacology and legal status of kratom", *Journal of the American Osteopathic Association*, vol. 116, No. 12 (2016), pp. 802–809.

e Darshan Singh, Suresh Narayanan and Balasingam Vicknasingam, "Traditional and non-traditional uses of mitragynine (kratom): a survey of the literature", *Brain Research Bulletin*, vol. 126, part 1 (2016), pp. 41–46.

f George C. Chang Chien, Charles A. Odonkor and Prin Amorapanth, "Is kratom the new legal high on the block?: The case of an emerging opioid receptor agonist with substance abuse potential", Pain Physician, vol. 20, No. 1 (2017), pp. E195–E198.

g United States Food and Drug Administration, Public Health Focus, "FDA and kratom". Available at www.fda.gov/NewsEvents/PublicHealthFocus/ucm584952.htm.

tablet and liquid form.[20] A change in NPS packaging in the United Kingdom was noted following the implementation of NPS legislation. The marketing of NPS previously focused on presenting them to give the perception of being legal alternatives to traditional drugs, with substances contained in bright, colourful and appealing packaging, but since about 2016 NPS have been increasingly presented in plastic wraps or bags with no detailed information on their contents.[21]

Recent data on the prevalence of NPS use show divergent trends. Data from England and Wales show that past-year NPS use among people 16–59 years old has fallen significantly, from 0.7 per cent in the period 2015/16 to 0.4 per cent in the period 2016/17.[22] NPS past-year use in Ireland, among the general population (15–64 years old), also declined from the period 2010–2011 to the period

20 Global Drug Survey 2017, detailed findings. Available at www.globaldrugsurvey.com.

21 Scotland, United Kingdom, Highland Substance Awareness Toolkit, "NPS at Crew Annual Report 2016–2017". Available at www.highlandsubstanceawareness.scot.nhs.uk/.

22 United Kingdom, Home Office, *Drug Misuse: Findings from the 2016/17 Crime Survey for England and Wales*, Statistical Bulletin 11/17 (July 2017).

2014–2015, from 3.5 per cent to 0.8 per cent. Findings in Australia, likewise, show a substantial drop in past-year use of synthetic cannabinoids in people aged 14 years or older, from 1.2 per cent in 2013 to 0.3 per cent in 2016.[23] Other countries where data were available, however, experienced an increase in NPS use among the general population. For example, in Czechia, NPS use rose from 0.5 per cent in 2014 to 1.2 per cent in 2015, and in Romania NPS use rose from 0.3 per cent in 2013 to 0.9 per cent in 2016. National household surveys are likely to underestimate drug use prevalence because they may be affected by the underrepresentation of a number of population subgroups known to have much higher than average rates of substance use, including the homeless and other marginalized groups.

Diverging trends in the use of new psychoactive substances among young people

Monitoring the rate of substance use among students provides an important insight into current youth risk behaviours and potential future trends in NPS use. In the several countries where recent trend data relating to young people are available, a decline in NPS use can be seen. In the United States, for example, past-year use of synthetic cannabinoids has dropped significantly among twelfth graders, from 11.3 per cent in 2012 to just under 3.7 per cent in 2017. That decrease may be due to several factors, namely legislation implemented in the United States during that period which placed a large number of synthetic cannabinoids under national control, and increasing awareness of the health risks associated with the use of those substances. In recent years, the use of synthetic cathinones among youth has become an issue of concern in the United States, but the level of use of those substances by twelfth graders has also decreased since 2012, from 1.3 per cent to 0.6 per cent in 2017.[24] In England, of the young people registered in specialist substance misuse services in the period 2016/17, the percentage that reported problematic use of NPS (4 per cent) was lower than for "ecstasy" (11 per cent) and cocaine (9 per cent).[25] The proportion of young people reported by specialist services as having problems with NPS fell by 45 per cent from the level seen in the period 2015/16.

In 2016, a survey of drug use among university students was conducted in Bolivia (Plurinational State of), Colombia, Ecuador and Peru, which revealed the use of synthetic cannabinoids for the first time in those countries.[26] Only a small proportion of those reporting the use of synthetic cannabinoids reported having used them exclusively; a far larger proportion had used them in combination with herbal cannabis. From 2012 to 2016, the number of synthetic cannabinoids reported by countries in South America increased each year, suggesting the growing importance of such substances among specific subgroups of the population in that subregion.

Continued use of new psychoactive substances by vulnerable and high-risk groups

Patterns of NPS use of among marginalized, vulnerable and socially disadvantaged groups, including homeless people and people with mental health disorders, continue to be documented in some countries.

Use of new psychoactive substances among the homeless population

The use of new psychoactive substances among homeless people has been documented in Czechia, Finland, Hungary, Ireland, the United Kingdom and the United States. Most recently, areas with the highest levels of social deprivation in Scotland reported an increase in the use of such substances.[27] In Manchester, England, a study was conducted on the homeless population in 2016. The study of 53 homeless people showed that rough sleepers (n=28) were more prone to the use of new psychoactive substances than non-rough sleepers (n=25). A total

23 Australian Institute of Health and Welfare, *National Drug Strategy Household Survey 2016: Detailed Findings.*

24 United States, Department of Health and Human Services, National Institute on Drug Abuse; "Monitoring the future survey: high school and youth trends", 14 December 2017. Available at www.drugabuse.gov/.

25 United Kingdom, Public Health England, Department of Health, *Young People's Statistics from the National Drug Treatment Monitoring System (NDTMS), 1 April 2016 to 31 March 2017* (London, 2017).

26 UNODC, *III Estudio Epidemiológico Andino sobre Consumo de Drogas en la Población Universitaria: Informe Regional 2016* (Lima, 2017).

27 National Records of Scotland, "Drug-related deaths in Scotland in 2016", 15 August 2017. Available at www.nrscotland.gov.uk/.

of 93 per cent of rough sleepers (n=26) had used such substances in the past year, compared with 64 per cent (n=16) of non-rough sleepers.[28] The majority (81 per cent) of those reporting use of new psychoactive substances also reported using other drugs, including cocaine and cannabis. Of those who reported using new such substances in the past year (n=42), 64 per cent had used them every day, and 14 per cent had used them five or six days per week. Synthetic cannabinoids were the substances most often reported. In Czechia, data pertaining to clients of needle-syringe programmes in the period 2013 and 2014 indicated that repeated synthetic cathinone use was associated with polydrug use and homelessness.[29]

Use of new psychoactive substances associated with mental health disorders

The use of new psychoactive substances among people with mental health disorders has previously been documented in studies in the United Kingdom. In Scotland, the use of such substances among inpatients aged 18–65 on general adult psychiatric wards was equal to 22 per cent (n=86) of total admissions analysed (n=388) between July and December 2014.[30] Of inpatients reporting NPS use, a diagnosis of drug-induced psychosis was significantly more likely, and a diagnosis of depression was significantly less likely. NPS use was prevalent among young male psychiatric inpatients, in particular among those diagnosed with drug-induced psychosis. Illicit drug use, specifically cannabis use, was common in this group. Stimulant NPS use was identified in adult inpatients released from general psychiatric wards more than three times more frequently than was synthetic cannabinoid use.

In a recent study in England, the current rate of use of NPS by patients prior to admission to a secure mental health setting stood at 12 per cent (218 patients).[31] About 20 per cent of mental health units had required an emergency response to assist with NPS use in the past 12 months. Those responses were related to emergency treatment for NPS that induced physical and psychological symptoms, such as collapse, cardiovascular symptoms and acute exacerbations of existing mental health conditions. Psychological symptoms were reported more frequently than physical symptoms. Some data indicate that male users of NPS admitted to acute inpatient wards in the United Kingdom are 10 times more likely to require care in the psychiatric intensive care unit than are inpatients that do not use NPS.[32]

High levels of use of new psychoactive substances reported by prisoners and people on probation

NPS use in prisons and among people on probation remains an issue of concern in numerous countries, including the United Kingdom and 14 other European countries,[33] New Zealand and the United States. It is likely that the high levels of NPS use in prisons are related to the challenge of detecting and identifying those substances. NPS use continued to be linked to violence, debt, organized crime and medical emergencies in most adult male prisons in the United Kingdom in 2017. Although NPS use was rarely identified prior to arrest, it was identified while the subject was either in custody or on probation.[34] Synthetic cannabinoids were the most frequent type of NPS used, and polydrug use was common. Some former detainees reported issues in maintaining their tenancies or placements in

28 Rob Ralphs, Paul Gray and Anna Norton, *New Psychoactive Substance Use in Manchester: Prevalence, Nature, Challenges and Responses* (Manchester, Substance Use and Addictive Behaviours, Research Group Manchester Metropolitan University, 2016).

29 Vendula Belackova and others, "'Just another drug' for marginalized users: the risks of using synthetic cathinones among NSP clients in the Czech Republic", *Journal of Substance Use*, vol. 22, No. 6 (2017), pp. 567–573.

30 Jack L. Stanley and others, "Use of novel psychoactive substances by inpatients on general adult psychiatric wards", *British Medical Journal*, vol. 6, No. 5 (2016).

31 United Kingdom, Public Health England, "A review of new psychoactive substances in secure mental health: summary document", (London, 2017).

32 Charlie Place and others, "Spice boys: an exploratory study around novel psychoactive substance use on a male acute ward", *Advances in Dual Diagnosis*, vol. 10, Nr. 3 (2017), pp. 97–104.

33 Countries reporting prison use: Bulgaria, Croatia, Czechia, Ireland, Finland, France, Germany, Hungary, Latvia, Poland, Portugal, Romania Slovenia and Sweden. EMCDDA, *High-risk Drug Use and New Psychoactive Substances: Results from an EMCDDA Trendspotter Study*, Rapid Communication Series (Luxembourg: Publications Office of the European Union, 2017).

34 United Kingdom, Her Majesty's Inspectorate of Probation and Care Quality Commission, *New Psychoactive Substances: The Response by Probation and Substance Misuse Services in the Community in England* (Manchester, 2017).

homeless hostels as a direct result of their NPS use. Continued NPS use was linked to addiction and inability to cope with withdrawal symptoms. The primary motives reported for ongoing use of NPS were the easier access to NPS compared with other drugs such as heroin or cocaine, and the desire to avoid detection. According to prison staff and detainees in the United Kingdom, prisons are becoming increasingly unsafe due to intoxicated NPS users and the violence associated with NPS-related debt and bullying.[35]

The proportion of detainees in New Zealand who had used synthetic cannabinoids in the previous 12 months declined from 47 per cent in 2013 to 20 per cent in 2016.[36] However, reported dependency among those users increased from 17 per cent in 2013 to 29 per cent in 2016, which underscores the health risks and dependence-inducing potential of synthetic cannabinoids. Detainees in New Zealand who had used synthetic cannabinoids in the previous 12 months used them an average of 97 days in 2016. In the United States, 29 per cent of prisoners in Illinois, for example, used synthetic cannabinoids in the 12 months prior to incarceration, some in combination with synthetic cathinones.[37] Among the most commonly reported reasons for their use were curiosity, desire to avoid positive drug test results, personal preferences and for relaxation.

Injecting use of stimulant new psychoactive substances remains a concern

The injecting of stimulant NPS, which are typically short-acting stimulants, remains a concern, in particular because of reported associated high-risk injecting practices. In addition to the high number of daily injecting episodes, the rate of sharing and reusing of injecting equipment is high among people who inject drugs (PWID) that inject stimulants.[38] Injecting use of NPS has been reported in France, Greece, Hungary, Ireland, Romania, Slovenia, the United Kingdom and the United States.[39]

The substitution of controlled drugs with stimulant NPS has been reported in Slovenia, where a study of 249 NPS users found that 3-methylmethcathinone (3-MMC) was being used as a replacement for cocaine.[40] While national data on PWID attending syringe exchange programmes in Hungary from 2011 to 2015 showed a transition from injecting use of amphetamine and heroin to injecting use of stimulant NPS,[41] the most frequently encountered substance in discarded injecting paraphernalia in 2016 was methadone, a prescription opioid, followed by several stimulant NPS.[42] Whereas methadone was mostly used in isolation, stimulant NPS largely co-occurred with additional substances.

Reports from needle exchange programmes in the United Kingdom indicate that many heroin users who switch to injecting stimulant NPS subsequently return to heroin injection after experiencing negative effects of NPS use. Injecting use of mephedrone has declined in England, Wales and Northern Ireland,[43] but those who had injected mephedrone during the preceding year were twice as likely to report having injected drugs with a needle or syringe that had previously been used by someone else.[44] A

35 United Kingdom, Her Majesty's Inspector of Prisons, *Her Majesty's Inspector of Prisons in England and Wales: Annual Report 2016–17* (London, 2017).

36 Chris Wilkins and others, *New Zealand Arrestee Drug Use Monitoring (NZ-ADUM): 2016 Report*, (Wellington, New Zealand Police and Massey University, 2017). Available at www.police.govt.nz/.

37 Lily Gleicher, Jessica Reichert and Dustin Cantrell, "Study of self-reported synthetic drug use among a sample of Illinois prisoners", 17 February 2017. Available at www.icjia.state.il.us/.

38 Andrea Fischer and others, The Link between Amphetamine-Type Stimulant Use and the Transmission of HIV and other Blood-borne Viruses in the Southeast Asia Region, ANCD Research Paper No. 25 (Melbourne, National Drug Research Institute, Australian National Council on Drugs, 2013).

39 *World Drug Report 2017* (United Nations publication, Sales No. E.17.XI.6).

40 Matej Sande, "Characteristics of the use of 3-MMC and other new psychoactive drugs in Slovenia, and the perceived problems experienced by users", *International Journal of Drug Policy*, vol. 27 (2016), pp. 65–73.

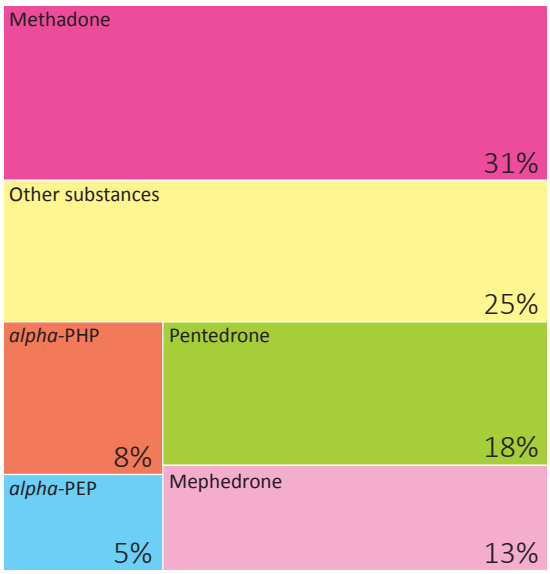
41 AnnaTarján and others, "HCV prevalence and risk behaviours among injectors of new psychoactive substances in a risk environment in Hungary: an expanding public health burden", *International Journal of Drug Policy*, vol. 41 (2017), pp. 1–7.

42 Valéria Anna Gyarmathy and others, "Diverted medications and new psychoactive substances: a chemical network analysis of discarded injecting paraphernalia in Hungary", *International Journal of Drug Policy*, vol. 46 (2017), pp. 61–65.

43 United Kingdom, Public Health England, "Shooting up: infections among people who inject drugs in the UK, 2016" (November 2017).

44 Ibid., "Shooting up: infections among people who inject drugs in the UK, 2015" (November 2016).

FIG. 8 Psychoactive substances found in discarded injecting paraphernalia in Hungary, 2016



Source: Valéria Anna Gyarmathy and others, "Diverted medications and new psychoactive substances—a chemical network analysis of discarded injecting paraphernalia in Hungary", 2017.

cross-sectional survey on PWID in Scotland covering 2,696 participants from selected agencies and pharmacies that provide injecting equipment recorded injecting use of NPS. Injection of NPS was first monitored in 2015/16, and for that survey period, 10 per cent of those who had injecting drug use in the past six months had injected NPS.[45]

Deaths related to new psychoactive substances are on the increase in some countries

In a number of countries, concerns have been growing over the harm caused by NPS, although the number of deaths caused by NPS constitute a relatively small portion of all drug-related deaths.[46]

NPS-related deaths may not be systematically recorded in all countries and trends for NPS-deaths differ from country to country. In England and Wales, NPS-related deaths have increased over the past five years, reaching 123 cases of the total of 2,593 drug misuse deaths in 2016.[47, 48] While the number of deaths related to synthetic cannabinoids more than tripled, from 8 deaths in 2015 to 27 deaths in 2016, the number of deaths related to the synthetic cathinone mephedrone fell by more than half, declining from 44 deaths in 2015 to 15 deaths in 2016.[49] Over the same period, NPS-related deaths in Germany more than doubled, from 39 deaths to 98 deaths. Overall, 1,333 drug-related deaths were reported in Germany in 2016, a 9 per cent increase from the previous year.[50] In Ireland, deaths related to NPS decreased from 14 deaths in 2014 to 7 deaths in 2015.[51]

Increasing use of benzodiazepines

Increases in use and deaths related to benzodiazepine-type NPS, sold under names such as "legal benzodiazepines" or "designer benzodiazepines", are a growing public health issue in some countries.[52] In Scotland, of the reported 867 drug-related deaths in 2016, 286 deaths were related to NPS use, and in most cases, benzodiazepine-type NPS were found to have been implicated in, or to have potentially contributed to, the cause of death. Most cases involved etizolam, with a few relating to diclazepam or phenazepam.[53] In Barcelona, a drug-checking service reported a massive increase in the number of samples that tested positive for benzodiazepine-type

45 Health Protection Scotland, University of the West of Scotland, Glasgow Caledonian University, West of Scotland Specialist Virology Centre, "Needle exchange surveillance initiative: prevalence of blood-borne viruses and injecting risk behaviours among people who inject drugs attending injecting equipment provision services in Scotland, 2008–09 to 2015–16" (Glasgow, Health Protection Scotland March, 2017).

46 For more information on drug-related deaths, including those associated with NPS with opioid effects, see booklet 2 of the present report.

47 Of the 3,744 cases of death, 2,038 were related to opiates, 460 to anti-depressants, and 219 to paracetamol.

48 United Kingdom, Office for National Statistics, "Statistical bulletin: deaths related to drug poisoning England and Wales—2016 registrations", 2 August 2017. Available at www.ons.gov.uk/.

49 Ibid.

50 Germany, Bundeskriminalamt, "Globalisierung und Digitalisierung prägen auch die Rauschgiftkriminalität", press release of 8 May 2017.

51 Ena Lynn and Suzi Lyons, d, "National drug-related deaths index 2004 to 2015 data", 12 December 2017. Available at www.hrb.ie/.

52 UNODC, "Non-medical use of benzodiazepines: a growing public health threat?" Global SMART Update, vol. 18 (September 2017).

53 National Records of Scotland, "Drug-related deaths in Scotland in 2016".

NPS, from 2.3 per cent in 2014 to 48.8 per cent in 2016, suggesting an increase in use.[54]

The synthetic opioid overdose crisis

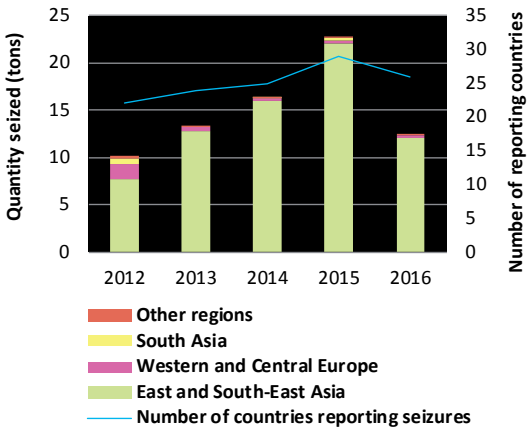
Many NPS with opioid effects have emerged in the past five years. Between 2009 and 2017, a total of 34 synthetic opioids, including 26 fentanyl analogues, were reported to UNODC early warning advisory by countries on all continents, and most of those synthetic opioids have been reported since 2016. The fentanyl analogues reported by most countries included furanylfentanyl, acetylfentanyl, ocfentanil and butyrfentanyl. Synthetic opioids belonging to other chemical groups were also reported, including U-47700, AH-7921, MT-45 and *O*-desmethyltramadol. The non-medical use of synthetic opioids in North America has escalated, leading to a crisis of overdose deaths, specifically in the United States and Canada, while dozens of deaths have also been reported in Europe (see booklet 3, section on opioids).

Ketamine

A widely used human and veterinary anaesthetic, ketamine is listed as an essential medicine by the World Health Organization. Because of its potential for abuse, the health risks associated with it, evidence of its illicit manufacture and its presence on illicit drug markets, ketamine is under national control in many countries.

The significant increases in global seizures of ketamine from 2012 to 2015 were largely attributable to increases in East and South-East Asia, with global seizures reaching 22 tons in 2015. In 2016, global seizures declined, which was largely due to a massive drop in quantities seized in China, including Hong Kong, China. In recent years, clandestine ketamine laboratories have been dismantled mainly in East and South-East Asia, with Chinese authorities dismantling 93 illicit ketamine manufacturing facilities in 2016 alone. In the same year, a clandestine ketamine manufacturing facility was dismantled in Malaysia for the first time ever.

FIG. 9 Quantities of ketamine seized globally and number of countries reporting ketamine seizures, 2012–2016



Source: UNODC, responses to the annual report questionnaire, 2012–2016.

54 S. Pérez González and others, "New designer benzodiazepines use in Barcelona", *European Psychiatry*, vol. 41, Suppl. (2017), p. 874.

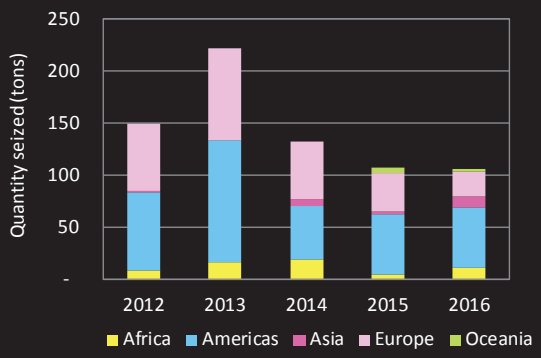
Khat: new aspects of a traditional plant-based drug

Khat *(Catha edulis)* is a shrub cultivated mainly in East Africa and the Arabian Peninsula. Khat leaves contain cathinone, a substance with stimulant effects similar to amphetamine, and their use has been a traditional practice in those areas. More recently, the use of khat has spread to Asia, Europe and North America, first among immigrants from the countries of traditional use and from there, into other communities.[a]

Although khat is not under international control, many national jurisdictions do not allow the import of khat leaves. Significant khat seizures are reported to UNODC each year, mainly by authorities of countries outside the areas of traditional use. The largest quantities seized are reported not in the country of origin but in the destination countries, including in North America and Europe.[b] Between 2012 and 2016, more than 700 tons of khat were seized by 35 countries.[c]

Traditionally, khat leaves are consumed in a fresh state, within 48 hours of being harvested. After that point, the quality of the leaves deteriorates and the quantity of cathinone, the main psychoactive component, decreases rapidly. In order to limit those effects and slow down the process of decay, khat leaves are often dried before being transported long distances.[d] Drying has the additional benefit of a reduction in the volume and weight of the leaves, making transportation easier. The number of countries reporting khat seizures increased from 2012 to 2016, and since 2015 seizures have been reported in other regions, such as Oceania, that are too far from the traditional sources to conserve freshness and hence maintain the potency of the khat. Despite the geographical expansion of khat shipments observed in seizure reports, the total quantities of khat seized are declining. Detailed studies on the global khat market and the patterns of khat use in destination countries are required to better understand this phenomenon.

Quantities of khat seized worldwide, 2012–2016 (tons)



Source: UNODC, responses to the annual report questionnaire, 2012–2016.

a Ling-Yi Feng and others, "New psychoactive substances of natural origin: a brief review", *Journal of Food and Drug Analysis*, vol. 25, No. 3 (2017), pp. 461–471; Birhane A. Berihu and others, "Toxic effect of khat *(Catha edulis)* on memory: systematic review and meta-analysis", *Journal of Neurosciences in Rural Practice*, vol. 8, No. 1 (2017), pp. 30–37.

b UNODC, questionnaire on new psychoactive substances for 2016.

c UNODC, responses to the annual report questionnaire, 2010–2016.

d World Customs Organization, Regional Intelligence Liaison Office for Western Europe; Ton Nabben and Dirk J. Korf, "Consequences of criminalisation: the Dutch khat market before and after the ban", *Drugs: Education, Prevention and Policy*, vol. 24, No. 4 (2017), pp. 332–339.

GLOSSARY

amphetamine-type stimulants — a group of substances composed of synthetic stimulants controlled under the Convention on Psychotropic Substances of 1971 and from the group of substances called amphetamines, which includes amphetamine, methamphetamine, methcathinone and the "ecstasy"-group substances (3,4-methylenedioxymethamphetamine (MDMA) and its analogues).

amphetamines — a group of amphetamine-type stimulants that includes amphetamine and methamphetamine.

annual prevalence — the total number of people of a given age range who have used a given drug at least once in the past year, divided by the number of people of the given age range, and expressed as a percentage.

coca paste (or coca base) — an extract of the leaves of the coca bush. Purification of coca paste yields cocaine (base and hydrochloride).

"crack" cocaine — cocaine base obtained from cocaine hydrochloride through conversion processes to make it suitable for smoking.

cocaine salt — cocaine hydrochloride.

drug use — use of controlled psychoactive substances for non-medical and non-scientific purposes, unless otherwise specified.

new psychoactive substances — substances of abuse, either in a pure form or a preparation, that are not controlled under the Single Convention on Narcotic Drugs of 1961 or the 1971 Convention, but that may pose a public health threat. In this context, the term "new" does not necessarily refer to new inventions but to substances that have recently become available.

opiates — a subset of opioids comprising the various products derived from the opium poppy plant, including opium, morphine and heroin.

opioids — a generic term applied to alkaloids from opium poppy (opiates), their synthetic analogues (mainly prescription or pharmaceutical opioids) and compounds synthesized in the body.

problem drug users — people who engage in the high-risk consumption of drugs; for example, people who inject drugs, people who use drugs on a daily basis and/or people diagnosed with drug use disorders (harmful use or drug dependence), based on clinical criteria as contained in the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association, or the International Classification of Diseases and Related Health Problems (tenth revision) of the World Health Organization.

people who suffer from drug use disorders/people with drug use disorders — a subset of people who use drugs. People with drug use disorders need treatment, health and social care and rehabilitation. Harmful use of substances and dependence are features of drug use disorders.

harmful use of substances — defined in the International Statistical Classification of Diseases and Related Health Problems (tenth revision) as a pattern of use that causes damage to physical or mental health.

dependence — defined in the International Statistical Classification of Diseases and Related Health Problems (tenth revision) as a cluster of physiological, behavioural and cognitive phenomena in which the use of a substance or a class of substances takes on a much higher priority for a given individual than other behaviours that once had greater value. A central descriptive characteristic of dependence syndrome is the desire (often strong, sometimes overpowering) to take psychoactive drugs.

substance or drug use disorders — the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association also refers to "drug or substance use disorder" as patterns of symptoms resulting from the use of a substance despite experiencing problems as a result of using substances. Depending on the number of symptoms identified, substance use disorder may vary from moderate to severe.

prevention of drug use and treatment of drug use disorders — the aim of "prevention of drug use" is to prevent or delay the initiation of drug use, as well as the transition to drug use disorders. Once a person develops a drug use disorder, treatment, care and rehabilitation are needed.

REGIONAL GROUPINGS

The World Drug Report uses a number of regional and subregional designations. These are not official designations, and are defined as follows:

- East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, Uganda and United Republic of Tanzania
- North Africa: Algeria, Egypt, Libya, Morocco, South Sudan, Sudan and Tunisia
- Southern Africa: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe
- West and Central Africa: Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone and Togo
- Caribbean: Antigua and Barbuda, Bahamas, Barbados, Bermuda, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines and Trinidad and Tobago
- Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama
- North America: Canada, Mexico and United States of America
- South America: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela (Bolivarian Republic of)
- Central Asia and Transcaucasia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- East and South-East Asia: Brunei Darussalam, Cambodia, China, Democratic People's Republic of Korea, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Singapore, Thailand, Timor-Leste and Viet Nam
- South-West Asia: Afghanistan, Iran (Islamic Republic of) and Pakistan
- Near and Middle East: Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, United Arab Emirates and Yemen
- South Asia: Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka
- Eastern Europe: Belarus, Republic of Moldova, Russian Federation and Ukraine
- South-Eastern Europe: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, Romania, Serbia, the former Yugoslav Republic of Macedonia and Turkey
- Western and Central Europe: Andorra, Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom of Great Britain and Northern Ireland
- Oceania: Australia, Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu and small island territories

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Following last year's 20th anniversary edition, the *World Drug Report 2018* is again presented in a special five-booklet format designed to enhance reader friendliness while maintaining the wealth of information contained within.

Booklet 1 summarizes the content of the four subsequent substantive booklets and presents policy implications drawn from their findings. Booklet 2 provides a global overview of the latest estimates of and trends in the supply, use and health consequences of drugs. Booklet 3 examines current estimates of and trends in the cultivation, production and consumption of the three plant-based drugs (cocaine, opiates and cannabis), reviews the latest developments in cannabis policies and provides an analysis of the global synthetic drugs market, including new psychoactive substances. Booklet 4 looks at the extent of drug use across age groups, particularly among young and older people, by reviewing the risks and vulnerabilities to drug use in young people, the health and social consequences they experience and their role in drug supply, as well as highlighting issues related to the health care needs of older people who use drugs. Finally, Booklet 5 focuses on the specific issues related to drug use among women, including the social and health consequences of drug use and access to treatment by women with drug use disorders; it also discusses the role played by women in the drug supply chain.

Like all previous editions, the *World Drug Report 2018* is aimed at improving the understanding of the world drug problem and contributing towards fostering greater international cooperation for countering its impact on health and security.

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DRUGS AND AGE

Drugs and associated issues among young people and older people

WORLD DRUG REPORT 2018

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PREFACE

Both the range of drugs and drug markets are expanding and diversifying as never before. The findings of this year's *World Drug Report* make clear that the international community needs to step up its responses to cope with these challenges.

We are facing a potential supply-driven expansion of drug markets, with production of opium and manufacture of cocaine at the highest levels ever recorded. Markets for cocaine and methamphetamine are extending beyond their usual regions and, while drug trafficking online using the darknet continues to represent only a fraction of drug trafficking as a whole, it continues to grow rapidly, despite successes in shutting down popular trading platforms.

Non-medical use of prescription drugs has reached epidemic proportions in parts of the world. The opioid crisis in North America is rightly getting attention, and the international community has taken action. In March 2018, the Commission on Narcotic Drugs scheduled six analogues of fentanyl, including carfentanil, which are contributing to the deadly toll. This builds on the decision by the Commission at its sixtieth session, in 2017, to place two precursor chemicals used in the manufacture of fentanyl and an analogue under international control.

However, as this *World Drug Report* shows, the problems go far beyond the headlines. We need to raise the alarm about addiction to tramadol, rates of which are soaring in parts of Africa. Non-medical use of this opioid painkiller, which is not under international control, is also expanding in Asia. The impact on vulnerable populations is cause for serious concern, putting pressure on already strained health-care systems.

At the same time, more new psychoactive substances are being synthesized and more are available than ever, with increasing reports of associated harm and fatalities.

Drug treatment and health services continue to fall short: the number of people suffering from drug use disorders who are receiving treatment has remained low, just one in six. Some 450,000 people died in 2015 as a result of drug use. Of those deaths, 167,750 were a direct result of drug use disorders, in most cases involving opioids.

These threats to health and well-being, as well as to security, safety and sustainable development, demand an urgent response.

The outcome document of the special session of the General Assembly on the world drug problem held in 2016 contains more than 100 recommendations on promoting evidence-based prevention, care and other measures to address both supply and demand.

We need to do more to advance this consensus, increasing support to countries that need it most and improving international cooperation and law enforcement capacities to dismantle organized criminal groups and stop drug trafficking.

The United Nations Office on Drugs and Crime (UNODC) continues to work closely with its United Nations partners to assist countries in implementing the recommendations contained in the outcome document of the special session, in line with the international drug control conventions, human rights instruments and the 2030 Agenda for Sustainable Development.

In close cooperation with the World Health Organization, we are supporting the implementation of the *International Standards on Drug Use Prevention* and the international standards for the treatment of drug use disorders, as well as the guidelines on treatment and care for people with drug use disorders in contact with the criminal justice system.

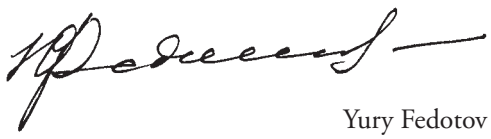
The World Drug Report 2018 highlights the importance of gender- and age-sensitive drug policies, exploring the particular needs and challenges of women and young people. Moreover, it looks into

increased drug use among older people, a development requiring specific treatment and care.

UNODC is also working on the ground to promote balanced, comprehensive approaches. The Office has further enhanced its integrated support to Afghanistan and neighbouring regions to tackle record levels of opiate production and related security risks. We are supporting the Government of Colombia and the peace process with the Revolutionary Armed Forces of Colombia (FARC) through alternative development to provide licit livelihoods free from coca cultivation.

Furthermore, our Office continues to support efforts to improve the availability of controlled substances for medical and scientific purposes, while preventing misuse and diversion – a critical challenge if we want to help countries in Africa and other regions come to grips with the tramadol crisis.

Next year, the Commission on Narcotic Drugs will host a high-level ministerial segment on the 2019 target date of the 2009 Political Declaration and Plan of Action on International Cooperation towards an Integrated and Balanced Strategy to Counter the World Drug Problem. Preparations are under way. I urge the international community to take this opportunity to reinforce cooperation and agree upon effective solutions.



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EXPLANATORY NOTES

The boundaries and names shown and the designations used on maps do not imply official endorsement or acceptance by the United Nations. A dotted line represents approximately the line of control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Disputed boundaries (China/India) are represented by cross-hatch owing to the difficulty of showing sufficient detail.

The designations employed and the presentation of the material in the *World Drug Report* do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities or concerning the delimitation of its frontiers or boundaries.

Countries and areas are referred to by the names that were in official use at the time the relevant data were collected.

All references to Kosovo in the *World Drug Report*, if any, should be understood to be in compliance with Security Council resolution 1244 (1999).

Since there is some scientific and legal ambiguity about the distinctions between "drug use", "drug misuse" and "drug abuse", the neutral terms "drug use" and "drug consumption" are used in the *World Drug Report*. The term "misuse" is used only to denote the non-medical use of prescription drugs.

All uses of the word "drug" in the *World Drug Report* refer to substances controlled under the international drug control conventions.

All analysis contained in the *World Drug Report* is based on the official data submitted by Member States to the United Nations Office on Drugs and Crime through the annual report questionnaire unless indicated otherwise.

The data on population used in the *World Drug Report* are taken from: *World Population Prospects: The 2017 Revision* (United Nations, Department of Economic and Social Affairs, Population Division).

References to dollars ($) are to United States dollars, unless otherwise stated.

References to tons are to metric tons, unless otherwise stated.

The following abbreviations have been used in the present booklet:

EMCDDA	European Monitoring Centre for Drugs and Drug Addiction
LSD	Lysergic acid diethylamide
GHB	*gamma*-Hydroxybutyric acid
MDMA	3,4-methylenedioxymethamphetamine
UNICEF	United Nations Children's Fund
WHO	World Health Organization
UNODC	United Nations Office on Drugs and Crime
INCB	International Narcotics Control Board
Europol	European Union Agency for Law Enforcement Cooperation

KEY FINDINGS

Drug use and associated health consequences are highest among young people

Surveys on drug use among the general population show that the extent of drug use among young people remains higher than that among older people, although there are some exceptions associated with the traditional use of drugs such as opium or khat. Most research suggests that early (12–14 years old) to late (15–17 years old) adolescence is a critical risk period for the initiation of substance use and that substance use may peak among young people aged 18–25 years.

Cannabis is a common drug of choice for young people

There is evidence from Western countries that the perceived easy availability of cannabis, coupled with perceptions of a low risk of harm, makes the drug among the most common substances whose use is initiated in adolescence. Cannabis is often used in conjunction with other substances and the use of other drugs is typically preceded by cannabis use.

Two extreme typologies of drug use among young people: club drugs in nightlife settings; and inhalants among street children

Drug use among young people differs from country to country and depends on the social and economic circumstances of those involved.

Two contrasting settings illustrate the wide range of circumstances that drive drug use among young people. On the one hand, drugs are used in recreational settings to add excitement and enhance the experience; on the other hand, young people living in extreme conditions use drugs to cope with their difficult circumstances.

The typologies of drugs used in these two different settings are quite different. Club drugs such as "ecstasy", methamphetamine, cocaine, ketamine, LSD and GHB are used in high-income countries, originally in isolated "rave" scenes but later in settings ranging from college bars and house parties to concerts. The use of such substances is reportedly much higher among young people. Among young people living on the street, the most commonly used drugs are likely to be inhalants, which can include paint thinner, petrol, paint, correction fluid and glue.

Many street children are exposed to physical and sexual abuse, and substance use is part of their coping mechanism in the harsh environment they are exposed to on the streets. The substances they use are frequently selected for their low price, legal and widespread availability and ability to rapidly induce a sense of euphoria.

Young people's path to harmful use of substances is complex

The path from initiation to harmful use of substances among young people is influenced by factors that are often out of their control. Factors at the personal level (including behavioural and mental health, neurological developments and gene variations resulting from social influences), the micro level (parental and family functioning, schools and peer influences) and the macro level (socioeconomic and physical environment) can render adolescents vulnerable to substance use. These factors vary between individuals and not all young people are equally vulnerable to substance use. No factor alone is sufficient to lead to the use of substances and, in many instances, these influences change over time. Overall, it is the critical combination of the risk factors that are present and the protective factors that are absent at a particular stage in a young person's life that makes the difference in their susceptibility to drug use. Early mental and behavioural health problems, poverty, lack of opportunities, isolation, lack of parental involvement and social support, negative peer influences and poorly equipped schools are more common among those who develop problems with substance use than among those who do not.

Harmful use of substances has multiple direct effects on adolescents. The likelihood of unemployment, physical health problems, dysfunctional social relationships, suicidal tendencies, mental illness and even lower life expectancy is increased by substance use in adolescence. In the most serious cases, harmful use of drugs can lead to a cycle in which damaged socioeconomic standing and ability to develop relationships feed substance use.

Many young people are involved in the drug supply chain due to poverty and lack of opportunities for social and economic advancement

Young people are also known to be involved in the cultivation, manufacturing and production of and trafficking in drugs. In the absence of social and economic opportunities, young people may deal drugs to earn money or to supplement meagre wages. Young people affected by poverty or in other vulnerable groups, such as immigrants, may be recruited by organized crime groups and coerced into working in drug cultivation, production, trafficking and local-level dealing. In some environments, young people become involved in drug supply networks because they are looking for excitement and a means to identify with local groups or gangs. Organized crime groups and gangs may prefer to recruit children and young adults for drug trafficking for two reasons: the first is the recklessness associated with younger age groups, even when faced with the police or rival gangs; the second is their obedience. Young people involved in the illicit drug trade in international markets are often part of large organized crime groups and are used mainly as "mules", to smuggle illegal substances across borders.

Increases in rates of drug use among older people are partly explained by ageing cohorts of drug users

Drug use among the older generation (aged 40 years and older) has been increasing at a faster rate than among those who are younger, according to the limited data available, which are mainly from Western countries.

People who went through adolescence at a time when drugs were popular and widely available are more likely to have tried drugs and, possibly, to have continued using them, according to a study in the United States. This pattern fits in particular the so-called "baby boomer" generation in Western Europe and North America. Born between 1946 and 1964, baby boomers had higher rates of substance use during their youth than previous cohorts; a significant proportion continued to use drugs and, now that they are over 50, this use is reflected in the data.

In Europe, another cohort effect can be gleaned from data on those seeking treatment for opioid use. Although the number of opioid users entering treatment is declining, the proportion who were aged over 40 increased from one in five in 2006 to one in three in 2013. Overdose deaths reflect a similar trend: they increased between 2006 and 2013 for those aged 40 and older but declined for those aged under 40. The evidence points to a large cohort of ageing opioid users who started injecting heroin during the heroin "epidemics" of the 1980s and 1990s.

Older people who use drugs require tailored services, but few treatment programmes address their specific needs

Older drug users may often have multiple physical and mental health problems, making effective drug treatment more challenging, yet little attention has been paid to drug use disorders among older people. There were no explicit references to older drug users in the drug strategies of countries in Europe in 2010 and specialized treatment and care programmes for older drug users are rare in the region; most initiatives are directed towards younger people.

Older people who use drugs account for an increasing share of deaths directly caused by drug use

Globally, deaths directly caused by drug use increased by 60 per cent from 2000 to 2015. People over the age of 50 accounted for 39 per cent of the deaths related to drug use disorders in 2015. However, the proportion of older people reflected in the statistics has been rising: in 2000, older people accounted for just 27 per cent of deaths from drug use disorders.

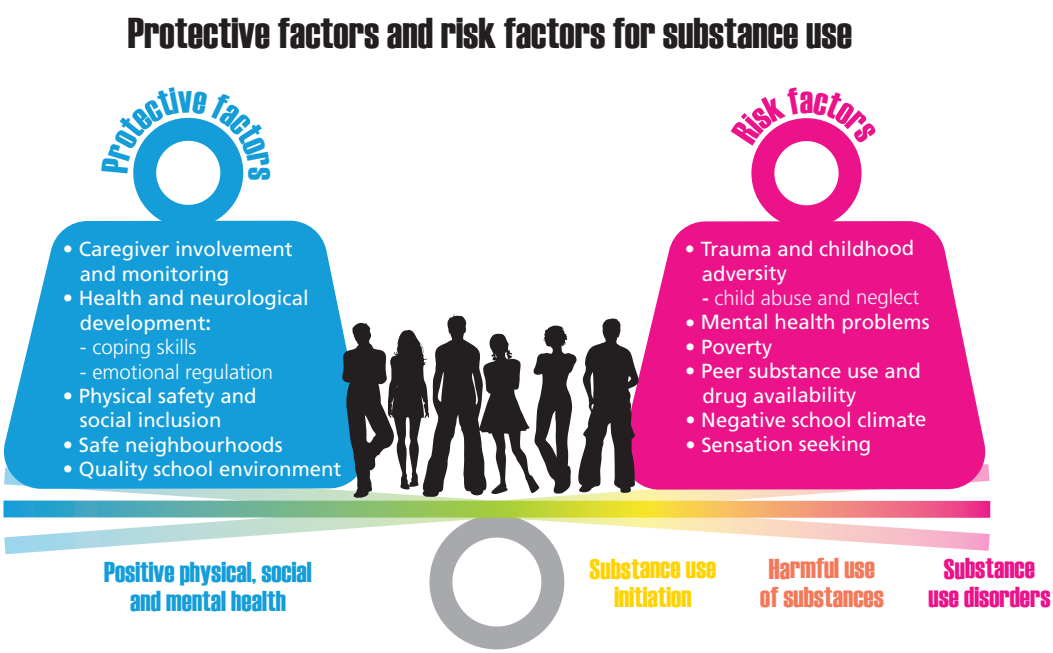
About 75 per cent of deaths from drug use disorders among those aged 50 and older are linked to the use of opioids. The use of cocaine and the use of amphetamines each account for about 6 per cent; the use of other drugs makes up the remaining 13 per cent.

INTRODUCTION

This booklet constitutes the fourth part of the *World Drug Report 2018* and is the first of two thematic booklets focusing on specific population groups. In this booklet, the focus is on drug issues affecting young and older people.

Section A provides an overview of how the extent and patterns of drug use vary across different age groups, using examples from selected countries. Section B contains a discussion of three aspects of drug use among young people. Based on a review of the scientific literature, the section describes the wide range of patterns of drug use among young people, including the use of inhalants among street children and drug use in nightlife settings. Next, there is a discussion of the link between child and youth development and the factors that determine pathways to substance use and related problems, as well as the social and health consequences of drug use among young people. The final part of the section contains a discussion of how the lives of young people are affected by illicit crop cultivation, drug production and trafficking in drugs.

Section C is focused on older people who use drugs. It describes the increases in the extent of drug use among older people that have been observed over the past decade or so in some countries. The possible factors that might help explain those increases are briefly explored. The particular issues faced by older people with drug use disorders in relation to drug treatment and care are also discussed. Finally, information on deaths due to drug use disorders illustrates the severe health impact of drug use on older people.



A. DRUG USE AMONG YOUNG PEOPLE AND OLDER PEOPLE

Trends in age demographics

The population in many parts of the world is relatively young. In 2016, more than 4 in every 10 people worldwide were younger than 25 years old, 26 per cent were aged 0–14 years and 16 per cent were aged 15–24 years. Europe was the region with the lowest proportion of its population under 25 (27 per cent) and Africa was the region with the highest proportion (60 per cent). However, in all regions, the proportion of the population aged 15–24 is projected to decline by 2050.[1]

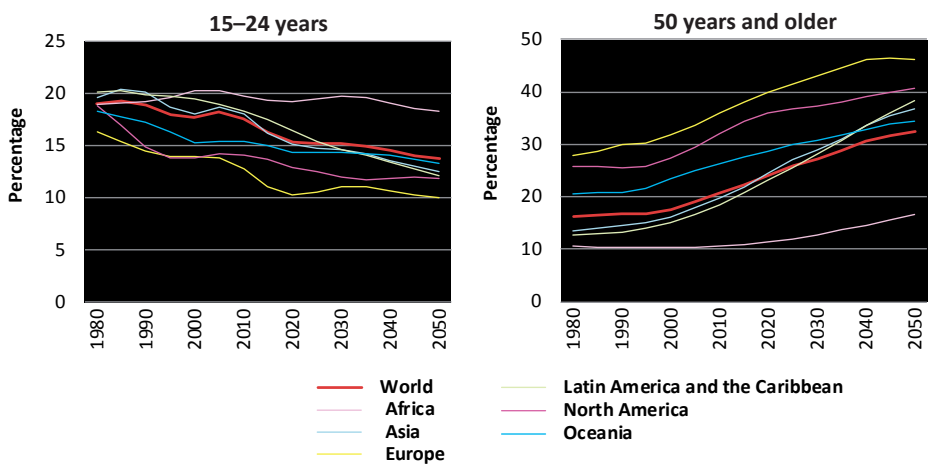
On the other hand, in recent years, gains in life expectancy have been achieved in all regions, with life expectancy globally projected to increase by 10 per cent over the next generation or so, from 71 years (2010–2015) to 77 years (2045–2050).[2] As a result, between 2016 and 2050, the number of people aged 50 and older is expected to almost double. By 2050, one third or more of the populations of all regions, except for Africa, will be aged 50 or older.

Extent of drug use is higher among young people than among older people

Surveys on drug use among the general population consistently show that the extent of drug use among older people remains lower than that among young people. Data show that peak levels of drug use are seen among those aged 18–25. This is broadly the situation observed in countries in most regions and for most drug types.

The extent of drug use among young people, in particular past-year and past-month prevalence, which are indicators of recent and regular use, remains much higher than that among older people. However, lifetime prevalence, which is an indicator of the extent of exposure of the general population to drugs, remains higher among older people than among young people for the use of substances that have been on the market for decades. Conversely, the use of substances that have emerged more recently or have infiltrated certain lifestyles are reportedly much higher among young people. One such example is "ecstasy", which has low levels of lifetime use and hardly any current use among older people, but high levels of lifetime use among young people.

FIG. 1 | Proportion of population aged 15–24 years and aged 50 years or older, 1980–2050

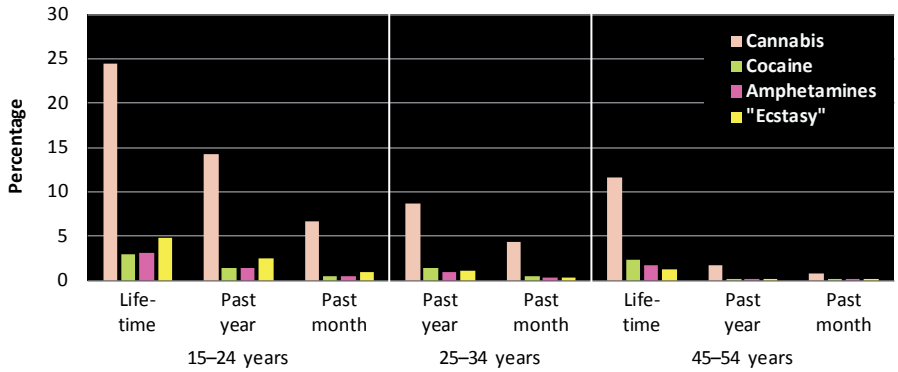


Source: United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects database, 2017 revision.

1 United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects database, 2017 revision.

2 United Nations, Department of Economic and Social Affairs, Population Division, "World population prospects: the 2017 revision, key findings and advance tables", Working paper No. ESA/P/WP/248 (New York, 2017).

FIG. 2 | Prevalence of drug use in Europe, by age group, 2017



Source: EMCDDA.

Note: The information represented is the unweighted average of data from the European Union member States, Norway and Turkey, reporting to EMCDDA on the basis of general population surveys conducted between 2012 and 2015.

Differences in the extent of lifetime drug use should be interpreted taking into account the "cohort effect", which pertains to differences in drug use, related attitudes and behaviours among people born during specific time periods.[3] Persons who reach the age of greatest vulnerability to drug use initiation during a period when drugs are popular and widely available are at particularly high risk of trying drugs and, possibly, continuing to use them.[4] One such example in the United States of America is of the "baby boomers" (those who were born between 1946 and 1964), who had the highest rates of substance use as young people compared with previous cohorts.[5] Typically, when a cohort of people starts using a certain substance in large numbers, as in the case of baby boomers, this is reflected in lifetime prevalence in the general population in the years to come, even when many of them discontinue drug use at a later stage. Therefore, lifetime prevalence is an indicator of the extent of exposure of the population and different age groups within the population at any point in time to drugs, while past-year and past-month prevalence are indicators of current levels of drug use in that population.

Given the paucity of drug use survey data from different regions, as well as the different measures of prevalence and age groups used in the surveys available, it is difficult to construct a global comparison of drug use between young people and older people. In the following paragraphs, therefore, examples from different countries and regions are presented to illustrate the extent of and compare drug use among the different age groups in those countries and regions.

In all the regions for which data could be analysed by age, current drug use is much higher among young people than older people. People aged over 40 generally have different patterns of drug use than young people, except when it comes to substances such as opium and khat, which have a long tradition of use in particular societies or cultures. Older people are typically not exposed as much as young people to new drugs that enter the market and they tend to follow the drug use patterns that were initiated during their youth.

Europe

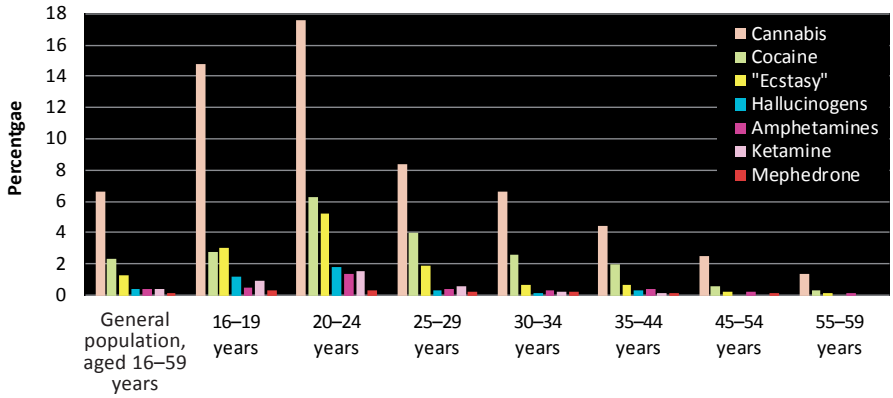
Data for the 28 States members of the European Union, plus Norway and Turkey, show that the lifetime use in those countries of amphetamines and "ecstasy" is between two and three times higher among those aged under 35 than among older people. Past-month use of most drugs is up to seven times higher among young people. However, current use of "ecstasy" is nearly 20 times higher among

3 Lloyd D. Johnston and others, *Monitoring the Future National Survey Results on Drug Use: 2016 Overview, Key Findings on Adolescent Drug Use* (Ann Arbor, Michigan, Institute for Social Research, University of Michigan, 2017).

4 J.D. Colliver and others, "Projecting drug use among aging baby boomers in 2020", *Annals of Epidemiology*, vol. 16, No. 4 (April 2006), pp. 257–265.

5 J. Gfroerer and others, "Substance abuse treatment need among older adults in 2020: the impact of the aging baby-boom cohort", *Drug and Alcohol Dependence*, vol. 69, No. 2 (March 2003), pp. 127–135.

FIG. 3 | Annual prevalence of drug use in England and Wales, fiscal year 2016–17



Source: United Kingdom of Great Britain and Northern Ireland, Office for National Statistics, "Drug misuse: findings from the 2016/17 crime survey for England and Wales", Statistical Bulletin 11/17 (London, July 2017).

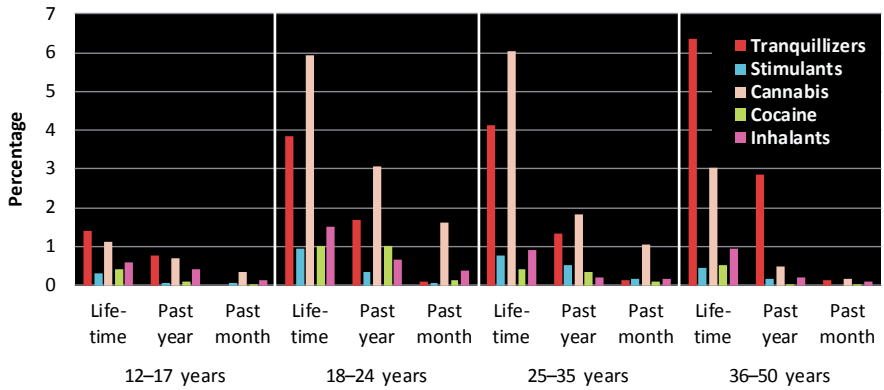
people aged 15–24 than among those aged 45–54. By contrast, the rates of lifetime prevalence of cocaine in Europe among those aged 15–24 and those aged 45–54 are comparable, while lifetime use of cannabis is much higher among those aged under 35. This may reflect differences in the age of initiation for those substances, as well as different historical levels of use among young people in Europe.

In England and Wales, the annual prevalence of drug use was highest in the 20–24 age group for all drug types in the period 2016–2017. For those aged 45 and older, the annual prevalence of drug use was considerably lower.

Bolivia (Plurinational State of)

In the Plurinational State of Bolivia, recent and current use of almost all substances is substantially higher among those aged 18–24 than among those in other age groups; as seen in the majority of countries, cannabis is the most commonly used drug across most age groups. The lifetime use of cannabis, cocaine, stimulants and inhalants is up to two times higher among those aged 18–24 than those aged 36 or older. In most cases, the past-year and past-month use of those substances is also reported at much higher levels among those aged 18–24 than among the 36–50 age group. For instance, the past-year use of cannabis is more than six times higher among those aged 18–24 than those aged 36–50.

FIG. 4 | Prevalence of drug use in the Plurinational State of Bolivia, by drug type and age group, 2014



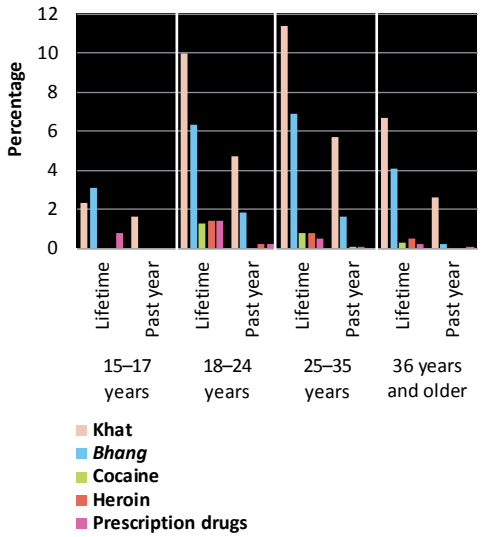
Source: Plurinational State of Bolivia, National Council against Drug Trafficking (CONALTID), *II Estudio Nacional de Prevalencia y Características del Consumo de Drogas en Hogares Bolivianos de Nueve Ciudades Capitales de Departamento, más la Ciudad de El Alto, 2014* (La Paz, 2014).

Conversely, the lifetime and past-year non-medical use of tranquillizers, the second-most misused substance in the Plurinational State of Bolivia, is almost twice as high among those aged 36–50, although the past-month use of tranquillizers was reported at similar levels among all age groups, except for 12–17 year olds.[6]

Kenya

In Kenya, older people report a higher use of established substances such as khat in different forms (*miraa* and *muguka*) and cannabis (*bhang* and hashish), while drugs that have become available in Africa more recently, such as cocaine and heroin, are reported to be used more frequently among those aged 18–24. Among the general population, khat and cannabis remain the two most commonly used substances, with the highest lifetime and past-year use among those aged 25–35. Conversely, the lifetime use of cocaine, heroin and prescription drugs is nearly three times higher among people aged 18–24 than among those aged 36 years and older.

FIG. 5 Prevalence of drug use in Kenya, by age group and drug type, 2012



Source: Kenya, National Authority for the Campaign Against Alcohol and Drug Abuse, *Rapid Situation Assessment of the Status of Drug and Substance Abuse in Kenya* (Nairobi, 2012).

United States

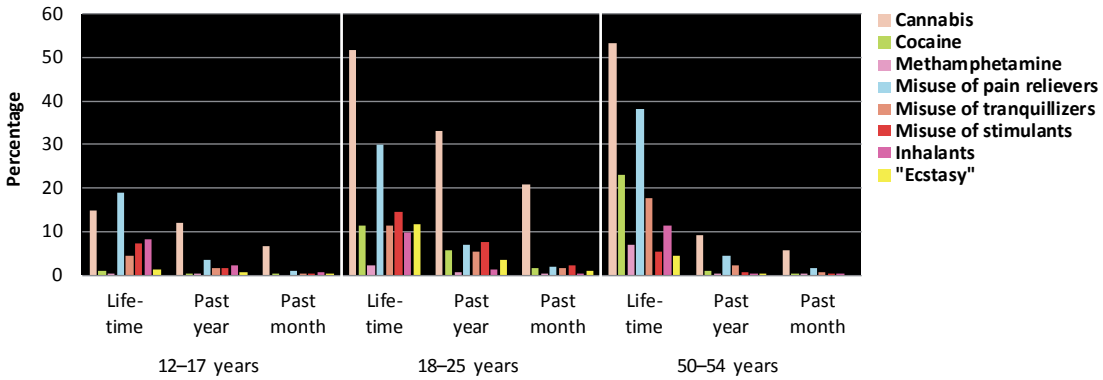
Data on drug use among the general population in the United States from 2017 show differences in the lifetime, past-year and past-month use of people aged 18–25 years compared with that of people aged 50–54. These differences are partly explained by the cohort effect. The cohort effect is visible in the lifetime prevalence of those who were young in the late 1960s and in the 1990s, which were times when an increase occurred in the use of numerous drugs by young people. Lifetime use of substances that have an established use over decades, such as cannabis, opioid painkillers, tranquillizers and inhalants, is comparable among those aged 50–54 and those aged 18–25.[7] For example, almost half of people in both age groups have used cannabis at least once in their lifetime. This pattern is different for cocaine and stimulants. The lifetime prevalence of cocaine among those aged 18–25 years is half of that among those aged 50–54 years. This is probably the result of a combination of factors, including the declining trends in cocaine use that were observed in the United States at the beginning of 2000 and the sharp decline in such use that was observed in 2006. Conversely, the lifetime non-medical use of stimulants and "ecstasy" among 18–25 year-olds is nearly three times that of the older cohort, reflecting the more recent appearance of these substances in the market. The extent of past-month use of most drugs remains up to three times higher and that of stimulants up to seven times higher among those aged 18–25 than among those aged 50–54. Hardly any current use of "ecstasy" is reported among those 50 years and older.[8]

6 Plurinational State of Bolivia, National Council against Drug Trafficking (CONALTID), *II Estudio Nacional de Prevalencia y Características del Consumo de Drogas en Hogares Bolivianos de Nueve Ciudades Capitales ae Departamento, más la Ciudad de El Alto, 2014* (La Paz, 2014).

7 United States, Substance Abuse and Mental Health Services Administration, Center for Behavioural Health Statistics and Quality, *Results from the 2016 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, 2017).

8 United States, Substance Abuse and Mental Health Services Administration, Center for Behavioural Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, *Key Substance Use and Mental Health Indicators in the United States: Results from the 2016 National Survey on Drug Use and Health*", HHS Publication No. SMA 17-5044, NSDUH Series H-52 (Rockville, Maryland, 2017).

FIG. 6 | Prevalence of drug use in the United States of America, by age group, 2017



Source: United States, Substance Abuse and Mental Health Services Administration, Center for Behavioural Health Statistics and Quality, *Results from the 2016 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, 2017).

B. DRUGS AND YOUNG PEOPLE

Drugs affect young people in every part of the world. Young people may use drugs, be involved in the cultivation or production of drugs, or be used as couriers. There are many factors at the personal, micro (family, schools and peers) and macro (socioeconomic and physical environment) levels, the interplay of which may render young people more vulnerable to substance use. Most research suggests that early (12–14 years old) to late (15–17 years old) adolescence is a critical risk period for the initiation of substance use.[9] Many young people use drugs to cope with the social and psychological challenges that they may experience during different phases of their development from adolescence to young adulthood (ranging from the need to feel good or simply to socialize, to personal and social maladjustments).[10]

For the purposes of the present section, as defined by the United Nations, young people are considered as those aged between 15 and 24 years.

Adolescence is the period when young people undergo physical and psychological development (including brain development); substance use may affect that development. Adolescence is universally a time of vulnerability to different influences when adolescents initiate various behaviours, which may include substance use. However, evidence shows that the vast majority of young people do not use drugs and those who do use them have been exposed to different significant factors related to substance use. The misconception that all young people are equally vulnerable to substance use and harmful use of substances ignores the scientific evidence, which has consistently shown that individuals differ in their susceptibility to use drugs. While specific influential factors vary between individuals, and no factor alone is sufficient to lead to harmful use of substances, a critical combination of risk factors that are present and protective factors that are absent makes the difference between a young person's brain that is primed for substance use and one that is not. Thus, from the perspective of preventing the initiation of substance use, as well as preventing the development of substance use disorders within the context of the healthy and safe development of young people, it is important to have a sound understanding of the patterns of substance use as well as the personal social and environmental influences that may result in substance use and substance use disorders among young people.

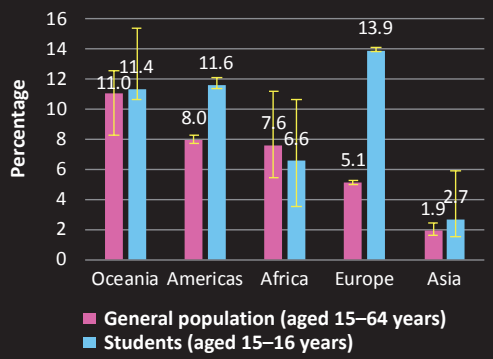
9 United States, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. "Age of substance use initiation among treatment admissions aged 18 to 30", The TEDS Report, (Rockville, Maryland, July 2014).

10 Jonathan Shedler and Jack Block, "Adolescent drug use and psychological health: a longitudinal inquiry", *American Psychologist*, vol. 45, No. 5 (1990), pp. 612–630.

Cannabis use among young people

In most countries, cannabis is the most widely used drug, both among the general population and among young people. A global estimate, produced for the first time by UNODC, based on available data from 130 countries, suggests that, in 2016, 13.8 million young people (mostly students) aged 15–16 years, equivalent to 5.6 per cent of the population in that age range, used cannabis at least once in the previous 12 months.

Annual prevalence of cannabis use among the general population aged 15–64 years and among students aged 15–16 years, 2016



Sources: UNODC, annual report questionnaire data and government reports.

Note: the estimate of past-year cannabis use in young people aged 15–16 years is based on school surveys in most countries, hence the use of the term "students".

High prevalence of cannabis use was reported in North America (18 per cent)[a] and in West and Central Europe (20 per cent), two subregions in which past-year cannabis use among young people was higher than in the general population in 2016. In some other subregions, estimates suggest that cannabis use among young people may be lower than among the general population. More research is needed to understand whether such a difference reflects the initiation of cannabis use at a later age in the areas concerned or is the result of comparatively higher under-reporting of drug use behaviour in young people due to sigma. Another factor may be that, at the age of 15–16, not all young people are necessarily still at school in some developing countries. Those in that age group who are still at school may not be representative of their age range regarding drug use behaviour; they may be part of an elite exhibiting lower drug use than those who are no longer at school.

[a] Excluding Mexico: 23 per cent.

Patterns of drug use among young people

Cannabis remains the most commonly used drug

With the exception of tobacco and alcohol, cannabis is considered the most commonly used drug among young people. Epidemiological research, which is mainly concentrated in high-income countries, suggests that the perceived easy availability of cannabis, coupled with perceptions of a low risk of harm, makes cannabis, after tobacco and alcohol, the most common substance used. Its use is typically initiated in late adolescence and peaks in young adulthood.[11] Medical research shows that those who use cannabis before the age of 16 face the risk of acute harm and increased susceptibility to developing drug use disorders and mental health disorders, including personality disorders, anxiety and depression.[12, 13] Approximately 9 per cent of all people who experiment with cannabis develop cannabis use disorders, whereas 1 in 6 among those who initiate its use as adolescents develop cannabis use disorders.[14] Between one quarter and one half of those who smoke cannabis daily develop cannabis use disorders.[15]

The use of other drugs is typically preceded by cannabis use. When compared with non-users, adolescent cannabis users have a higher likelihood of using other drugs even when controlled for other important co-variates such as genetics and environmental influences.[16] Cannabis use during adolescence and the subsequent use of other drugs during young adulthood could be, among other

11 Megan Weier and others, "Cannabis use in 14 to 25 years old Australians 1998 to 2013" Centre for Youth Substance Abuse Research Monograph No. 1 (Brisbane, Australia, Centre for Youth Substance Abuse, 2016).

12 Deidre M. Anglin and others, "Early cannabis use and schizotypal personality disorder symptoms from adolescence to middle adulthood", *Schizophrenia Research*, vol. 137, Nos. 1–3 (2012), pp. 45–49.

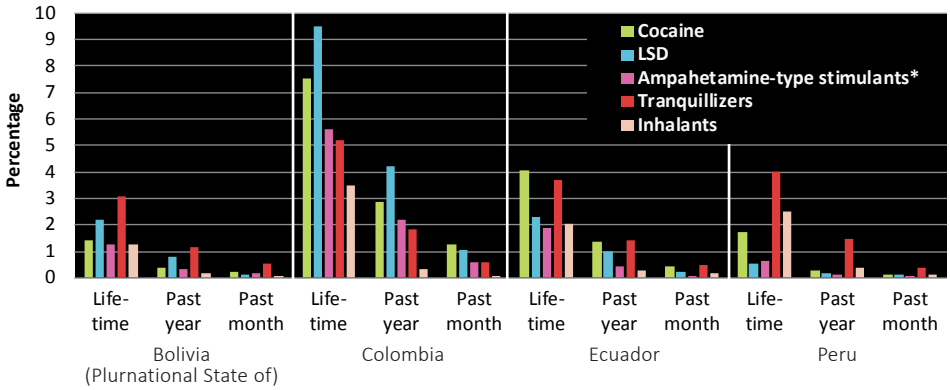
13 Shedler and Block "Adolescent drug use and psychological health".

14 Nora D. Volkow and others, "Adverse health effects of marijuana use", *New England Journal of Medicine*, 370(23) (2014), pp. 2219–2227.

15 Ibid.

16 Jeffrey M. Lessem and others, "Relationship between adolescent marijuana use and young adult illicit drug use", *Behavior Genetics*, vol. 36, No. 4 (2006), pp 498–506.

FIG. 7 Prevalence of drug use among university students in Bolivia (Plurinational State of), Colombia, Ecuador and Peru, 2016



Source: UNODC, *III Estudio Epidemiológico Andino sobre Consumo de Drogas en la Población Universitaria: Informe Regional 2016* (Lima, 2017).

* *Includes amphetamine, methamphetamine and "ecstasy".*

reasons, the result of common and shared environmental factors. Adolescent users of cannabis may come into contact with other cannabis-using peers or drug dealers who supply other drugs, which may result in increased exposure to a social context that encourages the use of other drugs.[17, 18] For example, a longitudinal study among adolescent twins showed that the twin who used cannabis differentially progressed towards the use of other drugs, alcohol dependence and drug use disorders at rates that were twice or even five times higher than the twin who did not use cannabis.[19]

A comparative study of drug use among university students (18–25 and older) in Bolivia (Plurinational State of), Colombia, Ecuador and Peru in 2016 showed that, after alcohol and tobacco, cannabis was the most commonly used drug among university students. Some 20 per cent of the students in Colombia had used cannabis in the past year, compared with 5 per cent in Bolivia (Plurinational State of) and Peru.

The reported use of other substances was also highest among university students in Colombia. The use of drugs such as cocaine, tranquillizers, LSD and inhalants was also reported among students in all four countries. The proportion of those who initiated drug use at a young age varied among males and females in the survey, with the extent of drug use among male students twice as high as among female students. Polydrug use was also common among the students, with one third of the students in Colombia reported having used two or more drugs concurrently in the past year, compared with 20 per cent in Ecuador and 7 per cent in Peru. Cannabis, cocaine, LSD and ecstasy were among the substances most commonly reported as used concurrently.

Spectrum of drug use in young people: from nightlife settings to the use of inhalants among street children

There are two contrasting settings that illustrate the wide range of circumstances that drive drug use among young people. On the one hand, drugs are used in recreational settings to add excitement and enhance the experience; on the other hand, young people living in extreme conditions use drugs to cope with the difficult circumstances in which they find themselves. This section briefly describes drug use among young people in those settings.

Use of stimulants in nightlife and recreational settings

Over the past two decades, the use among young people in high-income countries and those in urban

17 Ibid.

18 Wayne D. Hall and Michael Lynskey, "Is cannabis a gateway drug? Testing hypotheses about the relationship between cannabis use and the use of other illicit drugs", *Drug and Alcohol Review*, vol. 24, No. 1 (2005), pp. 39–48.

19 Lessem and others, "Relationship between adolescent marijuana use and young adult illicit drug use".

centres of club drugs such as MDMA, or "ecstasy", methamphetamine, cocaine, ketamine, LSD and GHB, has spread from isolated rave scenes to settings ranging from college bars and house parties to concerts. Some evidence on the approaches of young people to these drugs has been collected in specific contexts.

A qualitative study of club drug users in New York City, for example, found that club drug use could be grouped into three main patterns.[20] The first group were inclined to use mainly cocaine, but infrequently, and were identified as "primary cocaine users". This group had no exposure to other drugs or were disinclined to use multiple substances. The second group were identified as "mainstream users"; they were more inclined to experiment but were focused on the most popular club drugs. This group had a higher frequency of use and were also likely to have used "ecstasy", but were not likely to have extensive experience with other club drugs. The third group were identified as "wide-range users"; they had a higher frequency of use of more than one drug and were willing to experience "getting high" in different ways. Although there is heterogeneity among the third group, their drug use behaviours have been associated with profound immediate and long-term consequences.

Use of stimulants among socially integrated and marginalized young people

Outside nightlife settings, stimulants such as methamphetamine are also quite commonly used among young people in most parts of the world. A qualitative study in the Islamic Republic of Iran, identified three groups of young methamphetamine users.[21] The majority were those who had started using methamphetamine, known locally as *shisheh*, as a way of coping with their current opioid use, either to self-treat opioid dependence or to manage its adverse events. Another, smaller group, were those who had used *shisheh* during their first substance use or after a period of cannabis use, as novelty-seeking and to experience a new "high". The last group constituted those who had switched to methamphetamine use after participating in an opioid withdrawal programme and abstaining from opioid use for a period of time.

A review of studies in Asia and North America of risk factors among young people using methamphetamine identified a range of factors associated with methamphetamine use among socially integrated (low-risk) and marginalized (high-risk) groups of users.[22] Among socially integrated young people, males were more likely than females to use methamphetamine. Among that group, a history of engaging in a variety of risky behaviours, including sexual activity under the influence and concurrent alcohol and opiate use, was significantly associated with methamphetamine use. Sexual lifestyle and risky sexual behaviour were also considered risk factors. Engaging in high-risk sexual behaviour, however, could be a gateway for methamphetamine use, or vice versa. Among marginalized groups, females were more likely than males to use methamphetamines. Young people who had grown up in an unstable family environment or who had a history of psychiatric disorders were also identified as being at a higher risk of methamphetamine use.

Drug use among street children

While street children or street-involved youth are a global phenomenon, the dynamics that drive children to the streets vary considerably between high-income and middle- and low-income countries.[23] Young people in this situation in high-income countries have typically experienced conflict in the family, child abuse and/or neglect, parental substance use or poverty. In resource-constrained settings in low and middle-income countries, young people may be on the street because of abject poverty, the death of one or both parents or displacement as a result of war and conflict in addition to the reasons cited above.

20 Danielle E. Ramo and others, "Typology of club drug use among young adults recruited using time-space sampling", *Drug and Alcohol Dependence*, vol. 107, Nos. 2 and 3 (2010), pp. 119–127.

21 Alireza Noroozi, Mohsen Malekinejad and Afarin Rahimi-Movaghar, "Factors influencing transition to *shisheh* (methamphetamine) among young people who use drugs in Tehran: a qualitative study", *Journal of Psychoactive Drugs* (29 January 2018).

22 Kelly Russel and others, "Risk factors for methamphetamine use in youth: a systematic review", *BioMed Central Pediatrics,* vol. 8, No. 48 (2008).

23 Lonnie Embleton and others, "The epidemiology of substance use among street children in resource-constrained settings: a systematic review and meta-analysis", *Addiction*, vol. 108, No. 10 (2013), pp. 1722–1733.

Children working and living on the streets: street-involved children

UNICEF defines street children or youth as any girl or boy who has not reached adulthood, for whom the street has become her or his habitual abode and/or source of livelihood, and who is inadequately protected, supervised or directed by responsible adults.

Street children are categorized by their level of involvement in the streets into the following three groups:

1. **Child of the streets:** has no home but the streets. The child may have been abandoned by their family or may have no family members left alive. Such a child has to struggle for survival and might move from friend to friend, or live in shelters such as abandoned buildings.
2. **Child on the street:** visits his or her family regularly. The child might even return every night to sleep at home but spends most days and some nights on the street because of poverty, overcrowding or sexual or physical abuse at home.
3. **Child part of a street family:** some children live on the streets with the rest of their families, who may have been displaced because of poverty, natural disasters or wars. They move their possessions from place to place when necessary. Often, the children in these families work on the streets with other members of their families.

Source: WHO, "Working with street children: module 1, a profile of street children – a training package on substance use, sexual and reproductive health including HIV/AIDS and STDs", publication No. WHO/MSD/MDP/00.14 (Geneva, 2000).

TABLE 1 Lifetime prevalence of different substances among street-involved children and youth in resource-constrained settings

Substance used	Pooled analysis[a] of lifetime prevalence (percentage)	Confidence interval
Alcohol	41	31–50
Tobacco	44	34–55
Cannabis	31	18–44
Cocaine	7	5–9
Inhalants	47	36–58

Source: Lonnie Embleton and others, "The epidemiology of substance use among street children in resource-constrained settings: a systematic review and meta-analysis", Addiction, vol. 108, No. 10 (2013), pp. 1722–1733.

[a] *Pooled analysis is a statistical technique for combining the results, in this case the prevalence from multiple epidemiological studies, to come up with an overall estimate of the prevalence.*

Not only do street children live, survive and grow in an unprotected environment, but they also might be abused or exploited by local gangs or criminal groups to engage in street crimes or sex work. To survive in such a hostile environment, street children may do odd jobs such as street vending, hustling, drug dealing or begging, or may engage in "survival sex work", which is the exchange of sex for specific food items, shelter, money or drugs. Living in precarious conditions also makes street children and youth vulnerable to physical abuse, injuries and violence perpetuated by criminals, gangs or even local authorities.[24] It has also been shown that sexual and physical abuse of street children is strongly associated with their sexual and physical victimization.[25, 26] These vulnerabilities, together with the fact that street children may have families or parents with substance use problems, contribute to the development of substance use and psychiatric disorders among street children.

High levels of substance use among street children have been observed in many studies, but there are no global estimates and their patterns of substance

24 WHO, "Working with street children: module 1, a profile of street children – a training package on substance use, sexual and reproductive health including HIV/AIDS and STDs", publication No. WHO/MSD/MDP/00.14 (Geneva, 2000).

25 Kimberly A. Tyler and Lisa A. Melnder, "Child abuse, street victimization and substance use among homeless young adults", *Youth and Society*, vol. 47, No. 4 (2015), pp. 502–519.

26 Khaled H. Nada and El Daw A. Suliman, "Violence, abuse, alcohol and drug use, and sexual behaviors in street children of Greater Cairo and Alexandria, Egypt", *AIDS*, vol. 24, Suppl. 2 (2010), pp. S39–S44.

Different ways of using inhalants

Sniffing: solvents are inhaled directly from a container through the nose and mouth.

Huffing: a shirt sleeve, sock or a roll of cotton is soaked in a solvent and placed over the nose or mouth or directly into the mouth to inhale the fumes.

Bagging: a concentration of fumes from a bag is placed over the mouth and nose or over the head.

use may vary considerably. A systematic review and meta-analysis of studies on substance use among street children in resource-constrained settings reported that inhalants were the most common substance used, with a pooled analysis[27] putting lifetime prevalence of their use among street-involved children and youth at 47 per cent.[28] While the use of inhalants was found in all regions, use of cocaine among street-involved children was reported mainly in South and Central America, and alcohol use mostly in Africa and South and Central America.

Most of the scientific literature on the subject reports the use of inhalants or volatile substances among street children as a common phenomenon.[29] Such substances include paint thinner, petrol, paint, correction fluid and glue. They are selected for their low price, legal and widespread availability and ability to rapidly induce a sense of euphoria among users.[30]

There are also differences in the extent of substance use among street children that depend on the duration of their exposure to the street environment. Some 58 per cent of street-involved children interviewed for a study in Kenya reported using glue in the past month, making it the most commonly used substance among this group. [31] Other substances used by the children included alcohol, tobacco, miraa (a local psychoactive herb), cannabis and petrol. There were considerable differences in the extent of substance use among different categories of street children. The prevalence of past-month use was 77 per cent among those categorized as "children of the street", compared with 23 per cent reported by "children on the street" (see box for the definition.) Being male, older and having been on the streets for a longer period of time has also been associated with substance use.[32, 33] Similarly, the absence of family has been consistently associated with substance use among street-involved youth.[34]

Sudden sniffing death

The intensive use of volatile substances (even during only one session) may result in irregular heart rhythms and death within minutes, a syndrome known as "sudden sniffing death".

The use of psychoactive substances among street-involved children and youth is often part of their coping mechanism in the face of adverse experiences, such as the physical and sexual abuse and exploitation they experience being on the streets.[35] Therefore, many street-involved children perceive inhalants as a form of comfort and relief in a harsh environment, as they numb feelings. In one study, "wanting to forget or escape problems" was reported as the main reason for substance use among street-involved children. For many, peer pressure and the nature of their jobs influenced their use of inhalants.[36]

27 A pooled analysis is a statistical technique for combining the results, in this case the prevalence from multiple epidemiological studies, to arrive at an overall estimate of the prevalence.

28 Embleton and others, "The epidemiology of substance use among street children in resource-constrained settings". The meta-analysis looked at 50 studies on substance use among street children. Out of 27 studies, 13 covered resource-constrained settings in Africa, South and Central America, Asia, including the Middle East, and Eastern Europe.

29 L. Baydala, "Inhalant abuse", *Paediatrics Child Health*, vol. 15, No. 7 (September 2010), pp. 443–448.

30 Colleen A. Dell, Steven W. Gust and Sarah MacLean, "Global issues in volatile substance misuse", *Substance Use and Misuse*, vol. 46, Suppl. No. 1 (2011), pp. 1–7.

31 Lonnie Embleton and others, "Knowledge, attitudes, and substance use practices among street children in western Kenya", *Substance Use and Misuse*, vol. 47, No. 11 (2012), pp. 1234–1247.

32 Embleton and others, "The epidemiology of substance use among street children in resource-constrained settings".

33 Yone G. de Moura and others, "Drug use among street children and adolescents: what helps?", *Cadernos Saúde Pública,* vol. 28, No. 6 (2012), pp. 1371–1380.

34 Embleton and others, "The epidemiology of substance use among street children in resource-constrained settings".

35 UNODC, *Solvent Abuse among Street Children in Pakistan*, Publication No. UN-PAK/UNODC/2004/1 (Islamabad, 2004).

36 A. Elkoussi and S. Bakheet, "Volatile substance misuse among street children in Upper Egypt", *Substance Use and*

The injecting of drugs is also reported among street-involved youth. A cross-sectional study in Ukraine reported that 15 per cent of the children living on the streets were injecting drugs. Nearly half of them shared injecting equipment and 75 per cent were sexually active.[37] In another study among street children in Pakistan, cannabis and glue were the drugs most commonly used by the respondents (80 per cent and 73 per cent, respectively), while 9 per cent smoked or sniffed heroin and 4 per cent injected it.[38] Similarly, in a Canadian prospective cohort study among street-involved youth, 43 per cent of participants reported injecting drugs at some point.[39] Moreover, being helped with injecting was seen among a more vulnerable subgroup of respondents, i.e., those who were young and/or female. Those respondents were more likely to receive help in injecting methamphetamine than heroin or cocaine, in particular because of the higher daily frequency of injecting reported for methamphetamine.

Sexual abuse and exploitation is a common feature in the lives of street-involved children and may contribute to substance use. A study in Brazil reported that a significantly higher proportion of street-involved boys (two thirds) as compared with girls (one third) reported having had sex at some point in their lives. Over half of the respondents reported becoming sexually active before the age of 12. Almost half of the street-involved children interviewed reported more than three sexual partners in the past year. One third of the children reported having had unprotected sex under the influence of drugs or alcohol.[40] In Ukraine, a study showed that nearly 17 per cent of street-involved adolescent boys and more than half of adolescent street-involved girls had received payment for sex or had been forced to have sex.[41] The above-mentioned study in Pakistan showed that slightly more than half of street children had exchanged sex for food, shelter, drugs or money.

Street-involved children remain one of the most vulnerable, marginalized and stigmatized groups. They are exposed to abuse and violence, drug use and other behaviours that put them at high risk of HIV and tuberculosis infection, and other conditions including malnutrition and general poor health. Despite these vulnerabilities, they are often the most likely to be excluded from receiving any form of social or health-care support to ameliorate their condition.[42]

Polydrug use remains common among young people

As with adults, a major characteristic of drug use among young people is the concurrent use of more than one substance. Polydrug use remains fairly common among both recreational and regular drug users. However, polydrug use among young adults is symptomatic of more established patterns of use of multiple substances, which is linked to an increased risk of developing long-term problems as well as of engaging in acute risk-taking through binge drinking or binge use of stimulants such as "ecstasy" at rave parties or similar settings.[43]

Evidence collected in some regions and countries shows examples of the level and combinations of substances typically used by young people. In Europe, a wide variation in patterns of polydrug use among the population of drug users was reported, ranging from occasional alcohol and cannabis use to the daily use of combinations of heroin, cocaine, alcohol and benzodiazepines.[44] The most common polydrug use combinations reported in Europe

Misuse, vol. 46, Suppl. No. 1 (2011), pp. 35–39.

37 Joanna R. Busza and others, "Street-based adolescents at high risk of HIV in Ukraine", *Journal of Epidemiology and Community Health,* vol. 65, No. 11 (2011), pp. 1166–1170.

38 Susan S. Sherman and others, "Drug use, street survival, and risk behaviours among street children in Lahore, Pakistan", *Journal of Urban Health*, vol. 82, Suppl. No. 4 (2005), pp. iv113–iv124.

39 Tessa Cheng and others, "High prevalence of assisted injection among street-involved youth in a Canadian setting", *AIDS and Behaviour*, vol. 20, No. 2 (20160, pp. 377–384.

40 Fernanda T. de Carvalho and others, "Sexual and drug use risk behaviours among children and youth in street circumstances in Porto Alegre, Brazil", *AIDS and Behaviour*, vol. 10, Suppl. No. 1 (2006), pp. 57–66.

41 Busza and others, "Street-based adolescents at high risk of HIV in Ukraine".

42 UNICEF, *The State of the World's Children 2012: Children in an Urban World* (United Nations publication, Sales No. E.12.XX.1).

43 EMCDDA, *Polydrug Use: Patterns and Response* (Luxembourg, Office for Official Publications of the European Communities, 2009).

44 Ibid.

included tobacco, alcohol and cannabis, together with "ecstasy", cocaine, amphetamines, LSD or heroin.

In a national survey among college students in Brazil, cannabis, amphetamines, inhalants, tranquillizers and hallucinogens were the five drugs most frequently used with alcohol both in the past 12 months and in the past 30 days.[45] The results of the National Survey on Drug Use and Health in the United States showed that polydrug use among current "ecstasy" users aged 18–29 years was a common feature: among those users, 44 per cent had used three or more types of drug in the past year.[46] The most common combinations included cannabis, cocaine, tranquillizers and opiates.

The use of heroin and other opioids is problematic not only because of the potential for developing opioid use disorders, but also because of the increased likelihood of developing health problems associated with unsafe injecting practices. In the past decade, heroin use among young people showed declining trends in North America, but a recent resurgence of opioid use, along with the risky use of multiple substances, is also affecting young people. A qualitative study of young people who injected heroin in the United States showed that misuse of prescription opioids and tranquillizers was also quite common among them. They misused tranquillizers and prescription opioids not only as a substitute for heroin, but also to boost the effects of heroin, to manage withdrawals or even to reduce use or the risks associated with injecting heroin.[47]

45 Lúcio G. de Oliveria and others, "Polydrug use among college students in Brazil: a nationwide survey", *Revista Brasileira de Psiquiatria*, vol. 35, No. 3 (2013), pp. 221–230.

46 Katherine M. Keyes, Silvia S. Martins and Deborah S. Hasin, "Past 12-month and lifetime comorbidity and poly-drug use of ecstasy users among young adults in the United States: results from the national epidemiologic survey on alcohol and related conditions", *Drug and Alcohol Dependence,* vol. 97, Nos. 1 and 2 (2008), pp. 139–149.

47 E. S. Lankenau and others, "Patterns of prescription drug misuse among young injection drug users", Journal of Urban Health, vol. 89, No. 6 (December 2012).

Pathways to substance use disorders

Integrative developmental model for understanding pathways to substance use and harmful use of substances

Persons who initiate substance use and later develop substance use disorders typically transition through a number of stages, including initiation of use, escalation of use, maintenance, and, eventually, addiction.[48, 49] These pathways fluctuate in the use and desistance or cessation of drug use. Some groups of users may maintain moderate use for decades and never escalate. Others may exhibit intermittent periods of cessation, abstain permanently, or escalate rapidly and develop substance use disorders.

Understanding the risk factors that determine whether experimental users continue on a path to harmful use of substances is a question that has compelled researchers and practitioners to try to better understand, predict and appropriately intervene in these distinct etiological pathways.

The "ecobiodevelopmental" theoretical framework, founded on an integration of behavioural science fields, can help elucidate substance use pathways. In this model, human behaviour is viewed as the result of emerging from the "biological embedding"[50]

48 On the basis of the International Statistical Classification of Diseases and Related Health Problems (ICD 10) definition, the term "harmful use of substances" has been used in the present section instead of the term "substance abuse" to refer to a pattern of use that causes damage to physical or mental health. The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) of the American Psychiatric Association refers to "substance use disorder" as patterns of symptoms resulting from the use of a substance despite experiencing problems as a result of using substances. Depending on the number of symptoms identified, substance use disorder may vary from moderate to severe. Many of the scientific literature that dates prior to the introduction of DSM-5 refers to "substance abuse", which was defined in DSM-4 as a maladaptive pattern of substance use leading to clinically significant impairment or distress, including recurrent substance use in which it is hazardous or continuous use despite persistent social or interpersonal problems. Similarly, the term "addiction" refers to a chronic relapse condition that is characterized by compulsive drug-seeking despite harmful consequences.

49 Denise B. Kandel, ed., *Stages and Pathways of Drug Involvement: Examining the Gateway Hypothesis* (Cambridge, Cambridge University Press, 2002).

50 "Biological embedding" refers to how early personal experiences and environmental exposure are "built into the bodies".

FIG. 8 | Factors that determine different pathways to substance use and substances use disorders

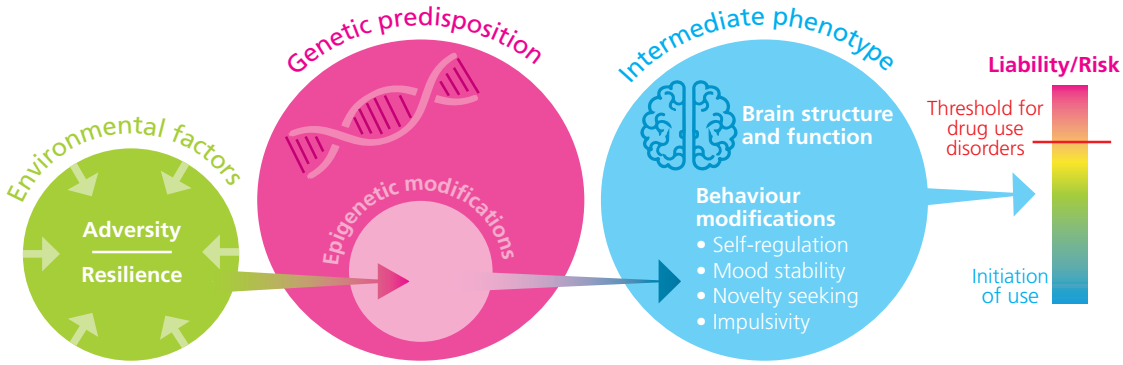


Figure 8 shows the two main categories of factors conferring risk for substance use: genes and the environment. Genetic variants are like switches: they are either turned on or off, but their expression is influenced by experience (i.e., epigenetic modifications). Environmental factors are more like dials that are turned up or down, also depending on experience. Risk or adversity factors include child maltreatment, poverty, poorly equipped schools, dysfunctional families, discrimination and witnessing violence. Resiliency or protective factors include high-quality education, housing, health care, social attachments and parenting. The combination of switches and dials crosses a liability threshold that, when predominantly negative, primes the brain for substance use. The functional relationship between factors is not linear, nor is it static; it fluctuates throughout a lifespan. Some environmental influences confer resiliency and may attenuate the effects of genetic predispositions. Thus, psychosocial interventions and practices are of the utmost importance in determining final outcomes.

of social and physical environmental conditions.[51] Individual-level characteristics, such as personality and genetics, interact with experiences and exposures to socioenvironmental factors to directly affect the developing brain's structure and function.[52, 53, 54]

This inherent "experience-dependence" of the brain means that the nature of conditions to which individuals are exposed — both optimal and suboptimal — influence the resultant behaviour. An abundance of positive experiences, such as protective factors including family support or well-equipped schools, can strengthen the neural connections underlying self-regulation, impulse control and executive decision-making. On the other hand, negative or adverse exposures can translate into impairments in a developing child's ability to regulate behaviour and emotions.[55, 56] Therefore, the exposures and experiences during an individual's developmental stage have differential effects on social, psychological and neural processes and have functional and behavioural implications.[57, 58]

Immediate micro-level factors, such as the family, and surrounding macro-level factors, such as the neighbourhood, which influence the development and prevalence of behaviour on individual functioning, are acknowledged in this framework.

While specific influential factors vary between individuals, and no factor alone is sufficient to lead to

51 Jack P. Shonkoff and Deborah A. Phillips, eds., *From Neurons to Neighborhoods: The Science of Early Childhood Development* (Washington, D. C., National Academy Press, 2000).

52 Hirokazu Yoshikawa, Lawrence J. Aber and William R. Beardslee, "The effects of poverty on the mental, emotional, and behavioral health of children and youth: Implications for prevention", *American Psychologist*, vol. 67, No. 4 92012), pp. 272–284.

53 Megan M. Sweeney, "Family-structure instability and adolescent educational outcomes: a focus on families with stepfathers", in *Whither Opportunity? Rising Inequality, Schools, and Children's Life Chances*, Greg J. Duncan and Richard J. Murnane, eds. (New York, Russell Sage Foundation, 2011), pp. 229–252.

54 Mary E. O'Connell, Thomas Boat and Kenneth E. Warner, eds., *Preventing Mental, Emotional, and Behavioral Disorders among Young People: Progress and Possibilities.* (Washington, D. C., National Academies Press, 2009).

55 Danya Glaser, "Child abuse and neglect and the brain: a review", *Journal of Child Psychology and Psychiatry*, vol. 41, No. 1 (2000), pp. 97–116.

56 Bruce S. McEwen and John H. Morrison, "The brain on stress: vulnerability and plasticity of the prefrontal cortex over the life course", *Neuron,* vol. 79, No. 1 (2013), pp. 16–29.

57 Susan L. Andersen, "Commentary on the special issue on the adolescent brain: adolescence, trajectories, and the importance of prevention", *Neuroscience and Biobehavioral Review*, vol. 70 (2016), pp. 329–333.

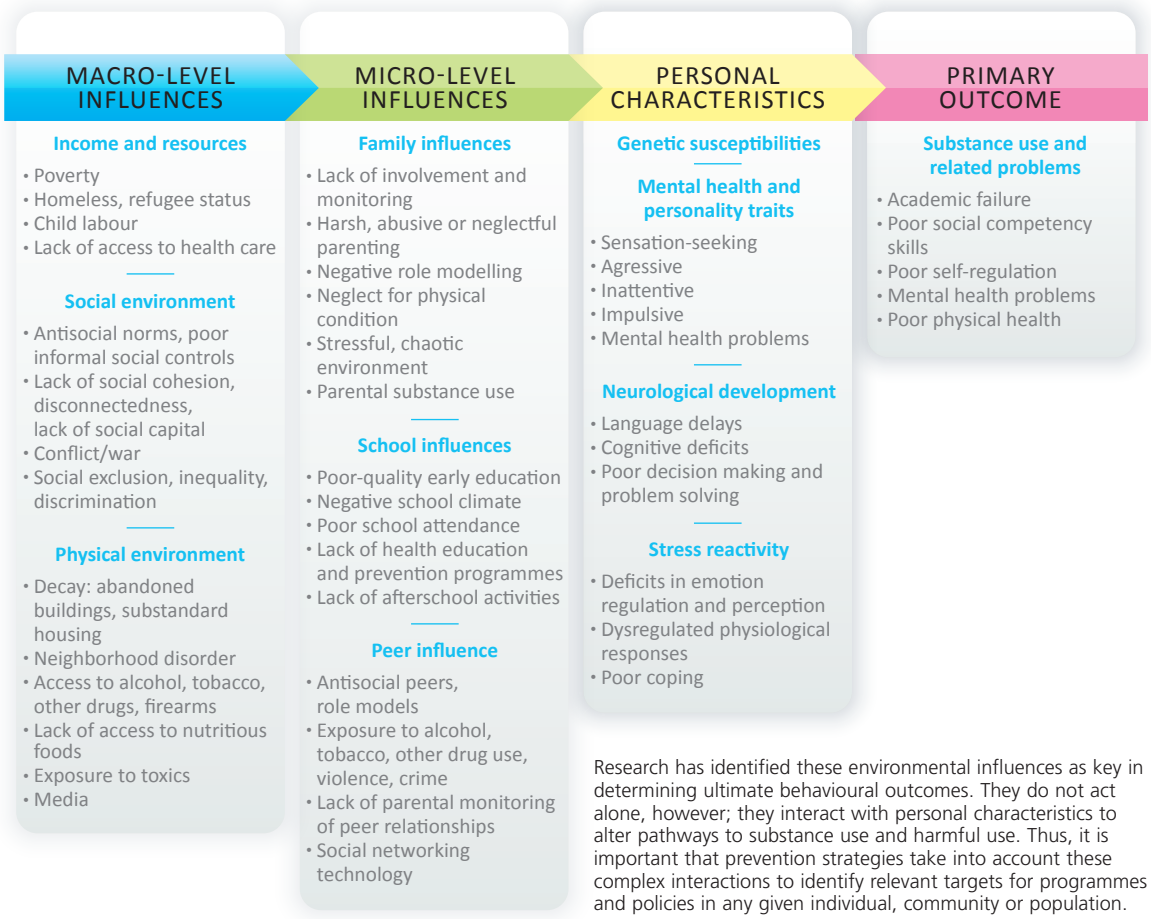
58 Sara B. Johnson, Jenna L. Riis and Kimberly G. Noble, "State of the art review: poverty and the developing brain", Pediatrics, vol. 137, No. 4 (2016).

harmful use of substances, there may be some critical combination of risk factors that are present and protective factors that are absent that makes the difference between having a brain that is primed for substance use and one that is not. This threshold is unique to each individual and can be affected by any number of potential combinations of external and personal factors. Brain development is exquisitely sensitive to psychosocial experiences. Such experiences affect the way the brain develops and functions and have a direct impact on a child's ability to self-regulate and, ultimately, on susceptibility to substance use. Substance use among adolescents is of particular concern given the evidence that substances with psychoactive effects have a greater impact on adolescents than adults. Age-related variations in drug responses are likely the result of differences in the pharmacological effects of substances on the brain systems that are still under construction. These differences may have significant implications for adolescents increasing the tendency to consume greater amounts and more drug types, thereby, compromising their neurodevelopment.

The evolution and the impact of drug use in childhood and youth can be characterized by three elements:

- Risk factors that determine the fragility or resilience of the individual to drug dependence
- The health and social impact of drug use on individual development
- The impact of caregivers' drug use on the individual

FIG. 9 | Risk factors in substance use and harmful use of substances



Research has identified these environmental influences as key in determining ultimate behavioural outcomes. They do not act alone, however; they interact with personal characteristics to alter pathways to substance use and harmful use. Thus, it is important that prevention strategies take into account these complex interactions to identify relevant targets for programmes and policies in any given individual, community or population.

Risk and protective factors

The present subsection contains a discussion of the association of person-level micro- and macro-level risk factors in substance use and harmful use as sources of vulnerability versus resilience. The consequences of eventual substance use for child and adolescent development and the multiple impacts of caregiver substance use on the development of the child and adolescent are also discussed. Throughout the subsection, the evidence of aetiology (causation) and knowledge regarding the consequences of drug use for the child and adolescent are discussed within the context of an integrated developmental framework.

Individual-level risk factors

An individual's characteristics play a significant role in determining whether that individual will use substances, will progress to harmful use of substances or will develop substance use disorders, or whether the individual will abstain from or desist such use during the developmental pathway. Taking these characteristics into account is important for three reasons: (a) neurobiological functioning, personality, emerging stress and coping strategies help to determine an individual's response to prevailing social and environmental influences, contributing to eventual outcomes; (b) personal-level characteristics have been shown to predict or moderate outcomes, as they interact with environmental influences in unique and complex ways; and (c) knowing these characteristics is critical in determining what prevention and treatment interventions may have the greatest potential to benefit any given individual or subgroup. This information can also help identify opportunities during the development of an individual for implementing the most effective prevention strategies. Favourable changes in these characteristics are expected if the intervention positively influences its targets (a mediation effect).

Particular personality traits have been associated with externalizing disorders, which have been consistently implicated in the use and harmful use of substances.[59] These characteristics include heightened reward sensitivity, poor inhibitory control, aggression and novelty-seeking.[60, 61] Variation in these personality dimensions, particularly impulsivity and novelty-seeking, may contribute to the initiation of substance use, as well as the transition from initial to intermittent and then regular substance use, the transition from harmful use to dependence or addiction, and the propensity for repeated relapse after achieving abstinence.[62] Individuals with these traits tend to seek highly stimulating and risky situations and show less anxiety in anticipation of the consequences of their behaviour.[63, 64]

Similar to environmental factors, personality influences also have a differential impact on these complex behaviours at different stages of an individual's development.[65, 66] Normative development during adolescence is typified by heightened levels of impulsivity and novelty-seeking, in part due to dramatic fluctuations in hormone levels that affect brain development and other systems. The subgroup of adolescents that exhibits an especially high level of any combination of these personality traits is at heightened risk of harmful use of substances. These characteristics may, in effect, contribute to individual differences in the reinforcing effects of drugs.[67]

59 Irene J. Elkins, Matt McGue and William G. Iacono, "Prospective effects of attention-deficit/hyperactivity disorder, conduct disorder, and sex on adolescent substance use and abuse", *Archives of General Psychiatry*, vol. 64, No. 10 (2007), pp. 1145–1152.

60 Michael J. Frank and others, "Genetic triple dissociation reveals multiple roles for dopamine in reinforcement learning", *Proceedings of the National Academy of Sciences*, vol. 104, No. 41 (2007), pp. 16311–16316.

61 Tilmann A. Klein and others, "Genetically determined differences in learning from errors". *Science*, vol. 318, No. 5856 (2007), pp. 1642–1645.

62 Mary J. Kreek and others, "Genetic influences on impulsivity, risk taking, stress responsivity and vulnerability to drug abuse and addiction", *Nature Neuroscience*, vol. 8, No. 11 (2005), pp. 1450–1457.

63 Ibid.

64 Didier Jutras-Aswad and others, "Cannabis-dependence risk relates to synergism between neuroticism and proenkephalin SNPs associated with amygdala gene expression: case-control study" *PloS ONE*, vol. 7, No. 6 (2012).

65 James J. Li and others, "Polygenic risk, personality dimensions, and adolescent alcohol use problems: a longitudinal study", *Journal of Studies on Alcohol and Drugs*, vol. 78, No. 3 (2017), pp. 442–451.

66 Kenneth S. Kendler, Charles O. Gardner and Carol A. Prescott, "Personality and the experience of environmental adversity", *Psychological Medicine*, vol. 33, No.7 (2003), pp. 1193–1202.

67 Caryn Lerman and Raymond Niaura, "Applying genetic

Behavioural and mental health

The co-occurrence of mental health and substance use disorders afflicts millions of people, according to data from multiple sources, including WHO. Specifically, internalizing symptoms such as post-traumatic stress disorder, depression and anxiety, along with externalizing behaviours such as conduct disorder, attention-deficit hyperactivity disorder, oppositional defiant disorder, antisocial personality disorder and certain other mental health conditions, are strongly and consistently related to the risk of harmful use of substances.[68] Individuals with these disorders are in general more likely to use substances and to do so at an earlier age than those without.[69, 70] Mood and anxiety disorders, for example, double the risk of an individual developing substance use disorders.[71]

The presence of mental and behavioural health disorders may exacerbate the role of poor or maladaptive stress reactivity patterns in the developmental pathways to substance use. Individuals with internalizing disorders tend to have higher levels of arousal in the brain systems that are responsible for stress responses, which may lead to a tendency to self-medicate the symptoms of anxiety and depression.[72] Those with externalizing disorders tend to have a lower level of arousal in these systems, which has been associated with a relative lack of regard for consequences and a need for additional stimulation.

The likelihood of a person with conditions such as post-traumatic stress disorder or attention-deficit hyperactivity disorder effectively meeting social challenges is diminished, as doing so requires intact neurocognitive and emotional functions which are often compromised in psychiatric disorders.[73]

Some of the mental health conditions that may be correlated with drug use have a gender factor, which translates into a gender differential in terms of the risk of harmful use and drug dependence: males more often exhibit antisocial personality disorder, while females demonstrate higher rates of mood and anxiety disorders.[74] Among both adolescents and adults, efforts to self-manage psychiatric symptoms further compound the harmful use of substances, as well as adding to the challenges associated with resistance to treatment for substance use disorders.[75]

Neurological development and adolescence

One pathway to harmful use of substances is believed to originate in a deviation or delay in neurological development that is thought to underlie the problem and risky behaviours that often precede substance use. Understanding the neurobiological contribution to the aetiology of substance use involves characterizing the brain maturation processes that occur during adolescence, such as reduced inhibitory control and increased reward sensitivity, and are associated with substance use.

Substance use and harmful use of substances are the result of a developmental process beginning in the prenatal period and lasting until a person is in their mid- to late 20s. Data from surveys on drug use indicate that initiation of substance use is most common in early to mid-adolescence and, for the subgroup of users that escalate, substance use peaks during the transition into young adulthood.[76] Criti-

approaches to the treatment of nicotine dependence", *Oncogene*, vol. 21, No. 48 (2002), pp. 7412–7420.

68 Tonya D. Armstrong, and Jane E. Costello, "Community studies on adolescent substance use, abuse, or dependence and psychiatric comorbidity", *Journal of Consulting and Clinical Psychology*, vol. 70, No. 6 (2002), pp. 1224–1239.

69 Michael D. De Bellis and others, "Brain structures in pediatric maltreatment-related posttraumatic stress disorder: a sociodemographically matched study" *Biological Psychiatry*, vol. 52, No. 11 (2002), pp. 1066–1078.

70 Cynthia L. Rowe and others, "Impact of psychiatric comorbidity on treatment of adolescent drug abusers", *Journal of Substance Abuse Treatment,* vol. 26, No. 2 (2004), pp. 129–140.

71 Susan B. Quello and others, "Mood disorders and substance abuse disorders: a complex comorbidity", *Science and Practice Perspectives,* vol. 3, No. 1 (2005), pp. 13–21.

72 Andrea M. Hussong and others, "An internalizing pathway to alcohol use and disorder", *Psychology of Addictive Behaviors*, vol. 25, No. 3 (2011), pp. 390–404.

73 Maria Kovacs and David Goldston, "Cognitive and social cognitive development of depressed children and adolescents", *Journal of the American Academy of Child and Adolescent Psychiatry,* vol. 30, No. 3 (1991), pp. 388–392.

74 United States, National Institute on Drug Abuse, "Comorbidity: addiction and other mental illnesses", NIDA Research Report Series, NIH Publication No. 10–5771 (Washington, D.C., 2010).

75 Kristin L. Tomlinson, Sandra Brown and Ana Abrantes, "Psychiatric comorbidity and substance use treatment outcomes of adolescents", *Psychology of Addictive Behaviors,* vol. 18, No. 3 (2004), pp. 160–169.

76 Rachel N. Lipari and others, "Risk and protective factors and estimates of substance use initiation: results from the 2016 National Survey on Drug Use and Health", NSDUH Data Review (September 2017).

cally, new social challenges, such as increased autonomous decision-making, that adolescents face coincide with complex changes in brain wiring and connectivity that take place throughout this time. These have implications for adaptive decision-making and the ability to self-regulate behaviour and emotion.[77] In effect, some degree of impulsivity, risk-taking and sensation-seeking is normative during adolescence, as indicated above. However, a heightened level of risk-taking may extend from a combination of social circumstances and non-normative neurodevelopmental immaturity or dysfunction.

Neurobiological development during adolescence occurs transitionally rather than as a single snapshot in time.[78] The prefrontal cortex, the part of the brain responsible for executive cognitive functions such as decision-making, impulse control and working memory, is still under construction. A central function of these executive cognitive functions is to shield long-term goals from temptations afforded by short-term benefits that often lead to negative consequences.[79] The prefrontal "top-down" cognitive regulation over subcortical regions is somewhat functionally disconnected throughout adolescence. This translates into the natural tendency of adolescents to act on emotional stimuli, with little cognitive control.[80] Through both the natural course of development and environmental experience, connections between the cognitive regulation and emotional stimuli regions of the brain are strengthened, providing a mechanism for increasing top-down regulation of emotional brain systems.[81]

In addition, brain circuits, such as ventral striatum, that are involved in processing rewards, show rapid maturation during the adolescent years, heightening sensitivity to rewarding experiences.[82, 83, 84] This development may play a unique role in the initiation of substance use in early to mid-adolescence and may be exaggerated in the subgroup that escalate use. Subsequent use of substances may exacerbate some adolescents' already heightened reward sensitivity, resulting in a strengthening of the drug's reinforcing properties.[85] Together with this increase in reward sensitivity, adolescence brings a series of other characteristics to the development process that compromise neurodevelopment and can cause measurable dysfunction in the brain systems. These include:

- A greater tendency to sensation- and novelty-seeking
- Early puberty and erratic hormone levels
- Detrimental environmental conditions such as stress, adversity, maltreatment and other negative experiences[86]

Regardless of the source of delayed or deficient neurodevelopment, the imbalance between social demands and emergent neurobiological systems during adolescence may lead to heightened vulnerability to substance use and escalation to harmful use of substance. This evidence has direct implications for the design of intervention components that target this period of development.

Source: B. J. Casey and R. M. Jones, "Neurobiology of the adolescent brain and behavior: implications for substance use disorder", *Journal of the American Academy of Child and Adolescent Psychiatry*, vol. 49, No. 12 (December 2010).

77 Scott Marek and others, "The contribution of network organization and integration to the development of cognitive control", *PLoS Biology*, vol. 13, No. 12 (2015).

78 B. J. Casey, Rebecca M. Jones and Hare A. Todd, "The adolescent brain", *Annals of the New York Academy of Sciences*, vol. 1124, No. 1 (2008), pp. 111–126.

79 Maria Kharitonova and Yuko Munakata, "The role of representations in executive function: investigating a developmental link between flexibility and abstraction", *Frontiers in Psychology*, vol. 2, art. 347 (2011).

80 Leah H. Somerville and B. J. Casey, "Developmental neurobiology of cognitive control and motivational systems", *Current Opinion in Neurobiology*, vol. 20, No. 2 (2010), pp. 236–241.

81 Nim Tottenham, Hare A. Todd and B. J. Casey, "Behavioral assessment of emotion discrimination, emotion regulation, and cognitive control in childhood, adolescence, and adulthood", *Frontiers in Psychology*, vol. 2, art. 39 (2011).

82 A. Padmanabhan and others, "Developmental changes in brain function underlying the influence of reward processing on inhibitory control", *Developmental Cognitive Neuroscience*, vol. 1, No. 4 (2011), pp. 517–529.

83 C. F. Geier and others, "Immaturities in reward processing and its influence on inhibitory control in adolescence", *Cerebral Cortex*, vol. 20, No. 7 (2010), pp. 1613–1629.

84 Somerville and Casey, "Developmental neurobiology of cognitive control and motivational systems".

85 Michael E. Hardin and Monique Ernst, "Functional brain imaging of development-related risk and vulnerability for substance use in adolescents", *Journal of Addiction Medicine*, vol. 3, No. 2 (2009), pp. 47–54.

86 Laurence Steinberg, "A dual systems model of adolescent risk-taking", *Developmental Psychobiology*, vol. 52, No. 3

Stress exposures and physiological reactivity

Stress is a major common denominator across the neurobiological, physiological, psychological and environmental domains implicated in susceptibility to substance use, substance use escalation, relapse and treatment resistance.

Stress refers to processes involving perception, appraisal and response to harmful, threatening or challenging external events or conditions, known as "stressors", such as poverty, prenatal exposures, child maltreatment, divorce and bereavement.

Source: A. Levine and others, "Molecular mechanism for a gateway drug: epigenetic changes initiated by nicotine prime gene expression by cocaine", *Science Translational Medicine*, vol. 3, No. 107 (November 2011).

Numerous studies have demonstrated the associations between increasing levels of emotional and physiological stress and decreases in behavioural control, higher levels of impulsivity and high levels of maladaptive behaviours.[87, 88, 89] There is also substantial evidence to support the role of stress in substance use pathways.[90, 91] Early life adversity in particular is markedly associated with an increased risk of substance use, harmful use and dependence.[92] This fundamental relationship is clearly demonstrated by the results of the Adverse Childhood Experiences study, as shown in table 2.[93, 94, 95] These findings suggest that very early development sets the stage for response to initiation of substance use by primary biological, psychological and social responses to initiation.

TABLE 2 Estimates of the population-attributable risk of adverse childhood experiences for selected outcomes among women

Population-attributable risk of adverse childhood experience	Substance use
65 per cent	Alcoholism
50 per cent	Harmful use of drugs
78 per cent	Injecting drug use

Early life adversity is markedly associated with increased risk of substance use, harmful substance use and drug dependence. Drug use may occur as a maladaptive response to stressful experiences.

Like all other risk factors, exposure to stress has differential effects on social, psychological and neural functioning and, in turn, on the risk of substance use and harmful use, based on sex, genetic vulnerabilities and developmental stages of exposure.[96, 97] In terms of sex differences, girls not only report a greater number of negative life events during adolescence than boys, but they are also more likely to experience interpersonal stressors and be adversely affected by them.[98] For example, post-traumatic stress disorder often antedates drug use and harmful drug use among girls but it occurs more often after harmful substance use in boys, perhaps suggesting

(2010), pp. 216–224.

87 Jumi Hayaki and others, "Adversity among drug users: relationship to impulsivity", *Drug and Alcohol Dependence*, vol. 7778, No. 1 (2005), pp. 65–71.

88 Barbara Greco and Mirjana Carli, "Reduced attention and increased impulsivity in mice lacking NPY Y2 receptors: relation to anxiolytic-like phenotype", *Behavioural Brain Research,* vol. 169, No. 2 (2006), pp. 325–334.

89 Martin Hatzinger and others, "Hypothalamic–pituitary–adrenocortical (HPA) activity in kindergarten children: importance of gender and associations with behavioral/emotional difficulties", *Journal of Psychiatric Research*, vol. 41, No. 10 (2007), pp. 861–870.

90 Hanie Edalati and Marvin D. Krank, "Childhood maltreatment and development of substance use disorders: a review and a model of cognitive pathways" *Trauma, Violence, & Abuse*, vol. 17, No. 5 (2016), pp. 454–467.

91 Christine M. Lee, Clayton Neighbors and Briana A. Woods, "Marijuana motives: young adults' reasons for using marijuana", *Addictive Behaviors*, vol. 32, No. 7 (2007), pp. 1384–1394.

92 Shanta R. Dube and others, "Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: the adverse childhood experiences study", *Pediatrics*, vol. 111, No. 3 (2003), pp. 564–572.

93 Daniel P. Chapman and others, "Adverse childhood experiences and the risk of depressive disorders in adulthood", *Journal of Affective Disorders*, vol. 82, No. 2 (2004), pp. 217–225.

94 Dube and others, "Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use".

95 Robert F. Anda and others, "Adverse childhood experiences and prescription drug use in a cohort study of adult HMO patients", *BMC Public Health*, 4 June 2008.

96 Kendler, Gardner and Prescott, "Personality and the experience of environmental adversity".

97 Susan L. Andersen and Martin H. Teicher, "Desperately driven and no brakes: developmental stress exposure and subsequent risk for substance abuse", *Neuroscience and Biobehavioral Reviews*, vol. 33, No. 4 (2009), pp. 516–524.

98 Xiaojia Ge and others, "Parents' stressful life events and adolescent depressed mood", *Journal of Health and Social Behaviour,* vol. 35, No. 1 (1994), pp. 28–44.

that females are more likely to self-medicate their symptoms, whereas males may be more likely to experience trauma owing to the risk situations associated with harmful substance use.[99] Females are also at increased risk of harmful substance use when exposed to the stressors of family violence and alcoholism.[100] These findings and many others reveal sex differences in the exposure to and experience of trauma and stress, as well as the differential influence of sex on substance use patterns, and suggest that gender aspects should be considered in etiological research and in the development of a prevention intervention or treatment plan.

Research shows that early life stress predisposes individuals to use substances later because the stressors have an impact on immature neurophysiological systems. In adolescence, when these emergent systems become increasingly functional, the damage is expressed in heightened risk of psychopathology.[101] Greater levels of stress also affect adolescents' already lowered behavioural and cognitive controls.[102, 103] Stress exposures disrupt both the hormonal and the physiological systems that regulate these functions, impairing learning, memory, decision-making and other functions that normally support the self-regulation of behaviour.[104, 105, 106] These biological stress responses activate the same neural systems that underlie the positive reinforcing effects of drugs,[107] potentially reinforcing drug-taking behaviours. As a result, drug taking may occur as a maladaptive response to stressful experiences. Recognizing the increased risk of substance use in young people who have experienced early life stressors is critical to guide efforts designed to both prevent exposure to and counteract the potential subsequent negative consequences of substance use.

Epigenetics, genetic variations and response to social influences

Genetic variations contribute to a determination of an individual's response to prevailing social influences; genetic influences on propensity to substance use and substance use disorders are thought to be mediated by individual characteristics in interaction with environmental factors, with stress exposures having a particular impact.[108] At the core of the interaction between genes and the environment are epigenetic modifications that occur at the level of gene activities in response to changes in the environment. Adverse experiences, especially in early life, have the potential to modify gene expression or suppression, which has important implications for phenotypic impact on stress hormones and behaviour.[109] Ongoing environmental change can further modify epigenetic processes, for better or for worse, helping to explain individual differences in response to stress as well as the potential for positive environmental change, for example through intervention, to reverse earlier negative modifications. As indicated in the "conceptual model" (figure 8 on page 23), not all people who are exposed to stress or trauma will exhibit maladaptive physiological and psychological stress responses that affect substance use and harmful use of substance.

99 Eva Y. Deykin and Stephen L. Buka, "Prevalence and risk factors for posttraumatic stress disorder among chemically dependent adolescents", *American Journal of Psychiatry*, vol. 154, No. 6 (1997), pp. 752–757.

100 Stephen T. Chermack, Brett E. Fuller and Frederic C. Blow, "Predictors of expressed partner and non-partner violence among patients in substance abuse treatment", *Drug & Alcohol Dependence*, vol. 158, Nos. 1 and 2 (2000), pp. 43–54.

101 Andersen and Teicher, "Desperately driven and no brakes".

102 Susan L. Andersen and Martin H. Teicher, "Stress, sensitive periods and maturational events in adolescent depression", *Trends in Neurosciences*, vol. 31, No. 4 (2008), pp. 183–191.

103 Rajita Sinha, "How does stress increase risk of drug abuse and relapse?", *Psychopharmacology,* vol. 158, No. 4 (2001), p. 343.

104 Gerald Heuther, "Stress and the adaptive self-organization of neuronal connectivity during early childhood", *International Journal of Developmental Neuroscience,* vol. 16, Nos. 3 and 4 (June/July 1998), pp. 297–306.

105 William R. Lovallo and others, "Lifetime adversity leads to blunted stress axis reactivity: studies from the Oklahoma family health patterns project", *Biological Psychiatry*, vol. 71, No. 4 (2012), pp. 344–349.

106 C. A. Nelson and L. J. Carver, "The effects of stress and trauma on brain and memory: a view from developmental cognitive neuroscience", *Development and Psychopathalogy*, vol. 10, No. 4 (1998), pp. 793–809.

107 George F. Koob and Michel Le Moal, "Drug abuse: hedonic homeostatic dysregulation", *Science*, vol. 278, No. 5335 (1997), pp. 52–58.

108 Mary-Anne Enoch, "The influence of gene–environment interactions on the development of alcoholism and drug dependence", *Current Psychiatry Reports*, vol. 14, No. 2 (2012), pp. 150–158.

109 Moshe Szyf and others, "The dynamic epigenome and its implications for behavioral interventions: a role for epigenetics to inform disorder prevention and health promotion", *Translational Behavioral Medicine*, vol. 6, No. 1 (2016), pp. 55–62.

Different susceptibility to harmful substance use is a function of the complex interrelationships between genetic, environmental and epigenetic factors that individuals experience dynamically.

While genes do not increase the risk of using or of developing harmful use of specific substances, there is evidence that they do affect neurobiological systems and phenotypic traits that more directly influence pathways to or from substance use. These systems and traits fundamentally interact with stress exposures that, when they are repeated or if they are severe, have the potential to compromise the development of neural systems that underlie social, behavioural, cognitive and emotional functioning in profound and enduring ways.[110, 111]

Micro-level influences

Substance use among young people cannot be understood or addressed without comprehending the social context within which individuals grow, develop and interact. Contextual factors that may vary across cultures can accentuate the relations between parenting and family, peer influences, pubertal timing and problem outcomes such as substance use, in ways that differ between the sexes. In the present subsection, both the liability factors that influence problem behaviour and the environmental conditions that may insulate individuals from negative outcomes are considered.

Parenting and family functioning

Parenting and the home environment exert profound influences on early child development in multiple domains of functioning.[112] The strength of parental influence on substance use, for example,

Children exposed to negative parenting qualities are two to four times more likely to develop mental and physical health issues than those within the norms.

Source: T. I. Herrenkohl and others, "Family influences related to adult substance use and mental health problems: a developmental analysis of child and adolescent predictors", The Journal of Adolescent Health, vol. 51, No. 2 (February 2012), pp. 129–135.

cannot be underestimated.[113] Parenting that is harsh, restrictive, inconsistent, hostile and/or high in conflict can often lead to negative behavioural outcomes in children.[114]

At the extreme of parenting behaviour, abuse, neglect and domestic violence, in particular, threaten every aspect of children's development. The quality of parenting further interacts with factors such as psychological well-being, exposure to stress and social support in predicting general antisocial behaviour, as well as substance use and substance use disorders.[115]

Parenting can exacerbate the risk of substance use as early as infancy, particularly for babies with a "difficult" temperament. These early signs are often manifested as irritability, frequent crying, withdrawal from affection, irregular sleeping or eating patterns, and inability to soothe. Such problems commonly originate in genetic, congenital and prenatal processes.[116] Babies with hard-to-manage temperaments may elicit negative responses such as rejection, ineffective practices, harsh discipline, maltreatment or substance use on the part of their caregivers. Any of these responses can exacerbate

110 Robin Davidson, "Can psychology make sense of change?", in *Addiction: Processes of Change*, Griffith Edwards and Malcom H. Lader, eds., Society for the Study of Addiction Monograph No. 3 (New York, Oxford University Press, 1994).

111 Pia Pechtel and Diego A. Pizzagalli, "Effects of early life stress on cognitive and affective function: an integrated review of human literature", *Psychopharmacology*, vol. 214, No. 1 (2011), pp. 55–70.

112 United States, National Research Council and Institute of Medicine of the National Academies, *Preventing Mental, Emotional, and Behavioral Disorders Among Young People: Progress and Possibilities*, Mary E. O'Connell, Thomas Boat and Kenneth E. Warner, eds. (Washington, D.C., National Academies Press, 2009).

113 Melissa A. Lippold and others, "Unpacking the effect of parental monitoring on early adolescent problem behavior: mediation by parental knowledge and moderation by parent-youth warmth", *Journal of Family Issues*, vol. 35, No. 13 (2014), pp. 1800–1823.

114 Anne E. Barret and R. Jay Turner, "Family structure and mental health: the mediating effects of socioeconomic status, family process, and social stress", *Journal of Health and Social Behavior*, vol. 46, No. 2 (2005), pp. 156–169.

115 Benjamin J. Hinnant, Stephen A. Erath and Mona El-Sheikh, J "Harsh parenting, parasympathetic activity, and development of delinquency and substance use", *Journal of Abnormal Psychology*, vol. 124, No. 1 (2015), pp. 137–151.

116 Lyndall Schumann and others, "Persistence and innovation effects in genetic and environmental factors in negative emotionality during infancy: a twin study", *PLoS ONE,* vol. 12, No. 4 (2017).

this developmental process.[117] This scenario can be particularly impactful in the context of pre-existing dysfunction or hardship in the caregivers, such as mental illness, harmful use of substances, antisocial behaviour or poverty.[118, 119] In addition, more "difficult" children can provoke harsher and less effective responses even from caregivers with the psychological wherewithal or physical resources to cope with their baby's special problems and needs. Once the caregiver-child relationship is strained, there is often less warmth, attachment and effective coping, further heightening the child's risk for maladaptive behaviours. In short, the child's responses stimulate predictable reactions from the social environment. This may reinforce or counteract the child's reactions, thus contributing to further changes in reactions from both the social environment and the child. This "action-reaction" sequence places the child at increased risk for long-term social maladjustment and risky behaviours. Rather than replacing one behaviour with another in response to changing socioenvironmental conditions, however, behaviours tend to diversify and can strengthen, weaken or reverse the developmental path over time.

In addition to parenting, various aspects of the family environment can influence a child's subsequent substance use behaviour. These can include structural characteristics, family cohesion, family communication and family management.[120] Family processes that tend to be the most averse are those with high levels of stress exposure and coercion.[121] Additionally, greater tendencies towards substance use have been found in adolescents from single-parent families, which is consistent with studies reporting that dual-parent families better afford protection against substance use.[122] This finding could be the result of the lack of a protective presence of an additional person in the home who can protect the child from stress exposure and lack of monitoring.

Parenting and the home environment continue to be important when adolescents begin to have more autonomy and opportunities for either prosocial or risky behaviours.[123] The effects of a chaotic home environment, ineffective parenting and lack of mutual attachment in particular have an impact on overall child outcomes.[124] This scenario may particularly affect girls, who tend to be more sensitive to family-centred and relational problems.[125, 126] This could heighten susceptibility among girls to stress and mental health issues, including early onset of substance use and harmful use, as well as other risky behaviours.

The regulatory skills that children need to resist substance use and other problem behaviours are instilled early in life, suggesting that a favourable home environment (family cohesion, family communication, and family management) confer protection against negative outcomes, including substance use.

Schools and educational opportunities

The quality of the school environment, teachers, the curriculum and students' social networks in school are major socializing influences on student

117 Kerry Lee, Rebecca Bull and Ringo M. Ho, "Developmental changes in executive functioning", *Child Development*, vol. 84, No. 6 (2013), pp. 1933–1953.

118 Thomas G. O'Connor and others, "Co-occurrence of depressive symptoms and antisocial behavior in adolescence: a common genetic liability", *Journal of Abnormal Psychology*, vol. 107, No. 1 (1998), pp. 27–37.

119 Thomas G. O'Connor, and others, "Genotype-environment correlations in late childhood and early adolescence: antisocial behavioral problems and coercive parenting", *Developmental Psychology*, vol. 34, No. 5 (1998), pp. 970–981.

120 Richard D. B. Velleman, Lorna J. Templeton and Alex G. Copello, "The role of the family in preventing and intervening with substance use and misuse: a comprehensive review of family interventions, with a focus on young people", *Drug and Alcohol Review*, vol. 24, No. 2 (2005), pp. 93–109.

121 Barret and Turner, "Family structure and mental health".

122 Gunilla R. Weitoft and others, "Mortality, severe morbidity, and injury in children living with single parents in Sweden: a population-based study", *Lancet*, vol. 361, No. 9354 (2003), pp. 289–295.

123 Monique Ernst and Sven C. Muller, "The adolescent brain: insights from functional neuroimaging research", *Developmental Neurobiology*, vol. 68, No. 6 (2008), pp. 729–743.

124 Kristen W. Springer and others, "Long-term physical and mental health consequences of childhood physical abuse: results from a large population-based sample of men and women", *Child Abuse and Neglect*, vol. 31, No. 5 (2007), pp. 517–530.

125 Jennifer Connolly and others, "Conceptions of cross-sex friendships and romantic relationships in early adolescence", *Journal of Youth and Adolescence*, vol. 28, No. 4 (1999), p. 481.

126 Eleanor E. Maccoby, *The Two Sexes: Growing Up Apart, Coming Together* (Cambridge, Massachusetts, Harvard University Press, 1999).

learning and behaviour.[127, 128] At a very basic level, absence from school through truancy, suspension or expulsion increases the risk of poor outcomes on multiple levels; chronic absenteeism may be especially problematic for children with self-regulatory problems.[129] Moreover, unqualified teachers, ineffective teaching practices and low-quality curricula confer significant additional risks, leading to academic failure.[130, 131] Lack of a good education and poor classroom management sets the stage for lower levels of cognitive functioning, poor social skills, high levels of stress and perceptions of inadequacy and failure,[132] each of which is implicated in risk of substance use. Absence of adequate educational support and/or targeted school programmes, learning disabilities and mental health problems further compound the risk of substance use and harmful substance use.[133] In the longer term, a poor-quality education results in an inability to compete in the workforce and obtain jobs that pay a good wage,[134] factors also associated with later substance use.

Another aspect of school influences is the important role of school connectedness. Research suggests that young people are more likely to have mental health problems and an increased likelihood of using substances in early secondary school when they report low school connectedness, and interpersonal conflict.[135, 136]

A child's attachment to school appears to be a component of resilience (a protective factor), indicating that effective and responsive teachers, evidence-based curricula and classroom reinforcements may play an important role in the prevention of substance use.

Peer influences and substance use

There is a strong association between adolescent substance use and contact with substance-using peers. Research suggests that other adolescents provide a unique source of access to drugs, reinforcement and opportunity to use drugs.[137, 138, 139] Adolescents tend to display similar behaviours, attitudes and personality traits to their friends.[140] Studies suggest that adolescents who choose substance-using friends may differ from those who do not. The quality of the friendship also seems to be a factor in determining the extent to which an individual may be influenced by a friend: a high-quality relationship may be more valued by an adolescent, who may be more likely to change their behaviour to please the friend. Closer friends may spend more time together, resulting in more modelling and emulation of high-risk behaviour. One of the ways in

127 Lyndal Bond and others, "Social and school connectedness in early secondary school as predictors of late teenage substance use, mental health, and academic outcomes", *Journal of Adolescent Health*, vol. 40, No. 4 (2007), pp. 357.e9-357.e18.

128 H. Harrington Cleveland and Richard P. Wiebe, "Understanding the association between adolescent marijuana use and later serious drug use: gateway effect or developmental trajectory?" *Development and Psychopathology*, vol. 20, No. 2 (2008,), pp. 615–632.

129 Christine A. Christle, Kristine Jolivette and C. Michael Nelson, "Breaking the school to prison pipeline: identifying school risk and protective factors for youth delinquency", *Exceptionality*, vol. 13, No. 2 (2005), pp. 69–88.

130 Ibid.

131 L. Darling-Hammond, "How teacher education matters", *Journal of Teacher Education*, vol. 51, No. 3 (2000), pp. 166–173.

132 Patrice L. Engle and Maureen M. Black, "The effect of poverty on child development and educational outcomes", *Annals of the New York Academy of Sciences*, vol. 1136, No. 1 (2008), pp. 243–256.

133 Michael J. Mason and Jeremy Mennis, "An exploratory study of the effects of neighborhood characteristics on adolescent substance use", *Addiction Research and Theory*, vol. 18, No. 1 (2010), pp. 33–50.

134 Frances A. Campbell and others, "Early childhood education: young adult outcomes from the Abecedarian project", *Applied Developmental Science*, vol. 6, No. 1 (2002), pp. 42–57.

135 Bond and others, "Social and school connectedness in early secondary school as predictors of late teenage substance use, mental health, and academic outcomes".

136 Richard F. Catalano and others, "Positive youth development in the United States: research findings on evaluations of positive youth development programs", *Annals of the American Academy of Political and Social Science*, vol. 591, No. 1 (2004).

137 Deirdre M. Kirke, "Chain reactions in adolescents' cigarette, alcohol, and drug use: similarity through peer influence or the patterning of ties in peer networks?", *Social Networks*, vol. 26, No. 1 (2004), pp. 3–28.

138 Bruce G. Simons-Morton and Tilda Farhat, "Recent findings on peer group influences on adolescent smoking", *Journal of Primary Prevention*, vol. 31, No. 4 (2010), pp. 191–208.

139 Kathryn A. Urberg and others, "A two-stage model of peer influence in adolescent substance use: individual and relationship-specific differences in susceptibility to influence", *Addictive Behaviors*, vol. 28, No. 7 (2003), pp. 1243–1256.

140 Ibid.

which peers appear to influence one another is through the idea of "pluralistic ignorance",[141] whereby the general belief that more individuals are engaging in substance use than actually are may contribute to their own use of substances.[142, 143] Conversely, those who believe substance use will have harmful consequences are less likely to engage in such use.[144]

There also appear to be some distinctive ways in which girls are influenced by peers to use substances. For example, they are more susceptible to social pressures when the source is a friend or partner.[145] Girls also tend to have a greater level of sensitivity to peer approval, depression and body image, which are all interrelated and can increase the risk of substance use.[146] Early pubertal development in girls can also play a role; for example, early-maturing girls are more likely to spend time with older males, who are inclined towards risk-taking activities and may introduce them to the use of substances.[147, 148] Pubertal onset, in particular among girls, is also associated with increased conflict among parents and adolescents with regard to issues such as selection of friends or dating and to shifting behavioural expectations[149, 150, 151] that can lead to more conduct problems, exposure to peer deviance and risky sexual behaviours.[152] Furthermore, residing in a disadvantaged neighbourhood appears to further exacerbate the effect of peers for both sexes.[153, 154]

Macro-level influences

The neighbourhood, the physical environment and the media

Social conditions in neighbourhoods have major implications for risk of substance use as they shape social norms, enforce patterns of social control, influence perception of the risk of substance use and affect psychological and physiological stress responses.[155] One aspect of neighbourhood influence is social cohesion, an indicator of attachment to and satisfaction with the neighbourhood and its residents that involves trust and support for one another in a community.

It has been suggested that high levels of social cohesion are associated with lower levels of substance use

141 Deborah A. Prentice and Dale T. Miller, "Pluralistic ignorance and alcohol use on campus: some consequences of misperceiving the social norm", *Journal of Personality and Social Psychology*, Vol. 64, No. 2 (1993), pp. 243–256.

142 Mitchell J. Prinstein and Shriley S. Wang, "False consensus and adolescent peer contagion: examining discrepancies between perceptions and actual reported levels of friends' deviant and health risk behaviors", *Journal of Abnormal Child Psychology*, vol. 33, No. 3 (2005), pp. 293–306.

143 Sarah L.Tragesser, Patricia A. Aloise-Young and Randall C. Swaim, "Peer influence, images of smokers, and beliefs about smoking among preadolescent nonsmokers", *Social Development*, vol. 15, No. 2 (2006), pp. 311–325.

144 National Centre on Addiction and Substance Abuse, Columbia University, *Adolescent Substance Use: America's #1 Public Health Problem* (New York, June 2011).

145 Vera Frajzyngier and others, "Gender differences in injection risk behaviors at the first injection episode", *Drug and Alcohol Dependence*, vol. 89, Nos. 2 and 3 (2007), pp. 145–152.

146 Steven P. Schinke, Lin Fang and Kristin C. A. Cole, "Substance use among early adolescent girls: risk and protective factors", *Journal of Adolescent Health*, vol. 43, No. 2 (2008), pp. 191–194.

147 David Magnusson and L. R. Bergman, "A pattern approach to the study of pathways from childhood to adulthood", in *Straight and Devious Pathways from Childhood to Adulthood*, Lee N. Robins and Michael Rutter, eds. (Cambridge, Cambridge University Press, 1990), pp. 101–115.

148 Karina Weichold, Rainer K. Silbereisen and Eva Schmitt-Rodermund, "Short-term and long-term consequences of early versus late physical maturation in adolescents", in *Gender Differences at Puberty,* Chris Hayward, ed., Cambridge Studies on Child and Adolescent Health Series (New York, Cambridge University Press, 2003), pp. 241–276.

149 Xiaojia Ge, Rand D. Conger and Glen H. Elder Jr., "Coming of age too early: pubertal influences on girls' vulnerability to psychological distress", *Child Development*, vol. 67, No. 6 (1996), pp. 3386–3400.

150 Roberta L. Paikoff and Jeanne Brooks-Gunn, "Do parent-child relationships change during puberty?, *Psychological Bulletin,* vol. 110, No. 1 (1991), pp. 47–66.

151 Lynda M. Sagrestano and others, "Pubertal development and parent-child conflict in low-income, urban, African American adolescents", *Journal of Research on Adolescence*, vol. 9, No. 1 (2010), pp. 85–107.

152 Dana L. Haynie, "Contexts of risk? Explaining the link between girls' pubertal development and their delinquency involvement", *Social Forces*, vol. 82, No. 1 (2003), pp. 355–397.

153 Xiaojia Ge and others, "It's about timing and change: pubertal transition effects on symptoms of major depression among African American youths", *Developmental Psychology*, vol. 39, No. 3 (2003), pp. 430–439.

154 Dawn Obeidallah and others, "Links between pubertal timing and neighborhood contexts: implications for girls' violent behaviour", *Journal of the American Academy of Child and Adolescent Psychiatry*, vol. 43, No. 12 (2004), pp. 1460–1468.

155 Elvira Elek, Michelle Miller-Day and Michael L. Hecht, "Influences of personal, injunctive, and descriptive norms on early adolescent substance use", *Journal of Drug Issues,* vol. 36, No. 1 (2006), pp. 147–172.

among adolescents, fewer perceived youth drug problems and fewer drug-related deaths.[156] The extent to which the neighbourhood is perceived as disorganized or disordered or is an area characterized by vandalism, abandoned buildings and lots, graffiti, noise and dirt may also influence levels of substance use among adolescents. The neighbourhood context has been found to be particularly influential for young people living in low-income urban areas owing to the high level of exposure to drug activity, disorder and violence in their neighbourhoods, all of which may influence substance use among young people.[157, 158] Many aspects of the physical design of the environment can also harm young people's overall development and social relations and lead to the commission of crime and to substance use.[159, 160]

Decayed and abandoned buildings, ready access to alcohol and other drugs, urbanization and neighbourhood deprivation are associated with drugs, crime, violence and accidents.

A high level of exposure to toxic substances such as heavy metals, in utero alcohol, lead, cadmium, mercury, manganese or arsenic is another aspect of the physical environment that can harm overall development. During the prenatal period and early childhood, such exposure has been shown to be strongly and consistently linked to functional deficits such as cognitive dysfunction and psychological disorders.[161] Such exposure has also been linked to later risk of harmful substance use, as well as other forms of psychopathology. Although the research is scant with respect to its direct association with substance use, such exposure is more definitively related to the personal characteristics, such as psychiatric disorders, lack of impulse control or cognitive deficits, that are known to increase the risk of substance use and harmful use of substances.

The media is a powerful influence on social norms and other messages that are favourable to substance use.[162] Adolescents in particular spend a great deal of time using the Internet, messaging services and social media, in particular on smartphones, as well as being entertained by television, movies and other media. Media portrayals of substance use as glamorous, fun and relaxing all contribute to the initiation and continued use of psychoactive substances among young people.[163] In essence, certain media messages can make substance use appear to be normative behaviour and can alter attitudes about the safety of substance use. Social media has been repeatedly linked to the initiation of substance use;[164, 165] for example, a study in the United States found an association between exposure to cannabis in popular music and initiation of its use among adolescents.[166]

Income and resources

Other macro-level influences include degrees of poverty that young people experience in their communities. A growing body of evidence has been

156 Peter Anderson and Ben Baumberg, *Alcohol in Europe: A Public Health Perspective*, (London, Institute of Alcohol Studies, 2006).

157 Anne Buu and others, "Parent, family, and neighborhood effects on the development of child substance use and other psychopathology from preschool to the start of adulthood", *Journal of Studies on Alcohol and Drugs*, vol. 70, No. 4 (2009), pp. 489–498.

158 Sharon F. Lambert and others, "The relationship between perceptions of neighborhood characteristics and substance use among urban African American adolescents", *American Journal of Community Psychology*, vol. 34, Nos. 3 and 4 (2004), pp. 205–218.

159 Tama Leventhal and Jeanne Brooks-Gunn, "The neighborhoods they live in: the effects of neighborhood residence on child and adolescent outcomes", *Psychological Bulletin*, vol. 126, No. 2 (2000), pp. 309–337.

160 National Research Council and Institute of Medicine, *From Neurons to Neighborhoods: The Science of Early Childhood Development*, Jack P. Shonkoff and Deborah A. Phillips, eds. (Washington, D.C., National Academies Press, 2000).

161 David C. Bellinger, "A strategy for comparing the contributions of environmental chemicals and other risk factors to neurodevelopment of children", *Environmental Health Perspectives*, vol. 120, No. 4 (2002), pp. 501–507.

162 Emily C. Feinstein and others, "Addressing the critical health problem of adolescent substance use through health care, research, and public policy", *Journal of Adolescent Health*, vol. 50, No. 5 (2012), pp. 431–436.

163 Ibid.

164 Chrstine McCauley Ohannessian and others, "Social media use and substance use during emerging adulthood", *Emerging Adulthood*, vol. 5, Issue 5 (2017), pp. 364–370.

165 Caitlin R. Costello and Danielle E. Ramo, "Social media and substance use: what should we be recommending to teens and their parents?", *Journal of Adolescent Health*, vol 60, Issue 6, (2017) pp. 629–630.

166 Brian A. Primack and others, "Exposure to cannabis in popular music and cannabis use among adolescents", *Addiction,* vol. 105, (2009), pp. 515–523.

Among the main risk factors for substance use in impoverished neighbourhoods are:

- A high proportion of single-parent families
- Racial segregation and inequality based on race, sex or other characteristics
- Homelessness
- Transiency and malnutrition
- Poorly equipped schools and poorly trained teachers
- High levels of child abuse and infant mortality
- High school dropout rates, academic failure, crime, delinquency and mental illness

amassed to aid understanding of how overall conditions in impoverished communities lead to considerable delays or deficits in child and adolescent development.[167]

On an individual level, the influence of poverty on families and parenting can lead to harmful effects on child and youth development by increasing stress among parents and caregivers, reducing their ability to invest in learning and educational opportunities and compromising their ability to be involved, patient, responsive and nurturing parents to their children.[168] These conditions — both individually and through their interaction — are risk factors for substance use.[169] The caregiving environment for children in low-income families is more likely to be disorganized and lacking in appropriate stimulation and support, thereby creating conditions that are stressful for children.[170, 171] Stress in the context of an impoverished and unsupportive environment impedes growth, leads to dysregulated physiological responses to stressful situations, increases the risk of psychological disorders such as depression, anxiety and traumatic stress disorders and compromises the development of self-regulatory skills: these are all factors that increase vulnerability to substance use.

Young people who experience extreme poverty or a lack of resources are subject to a host of environmental and health factors including homelessness, street involvement, exposure to toxic substances and work at a young age. As a result, there is a high incidence of behavioural and psychological problems, including use and harmful use of substances, among these young people.[172, 173] In terms of implications for prevention, high-quality caregiving moderates the effects of poverty on child development, [174] in particular for girls.[175] Increased availability of services for disadvantaged children can foster their potential to develop skills that would improve their chances of success in school and life and combat many of the risk factors for substance use.[176]

Discrimination and social exclusion

Another macro-level factor affecting child development is discrimination and social exclusion, which arise from structural and cultural perspectives. Structural inequalities lead to adverse educational, health and behavioural outcomes and are largely the result

167 Clancy Blair, "Stress and the development of self-regulation in context", *Child Development Perspectives*, vol. 4, No. 3 (2010), pp. 181–188.

168 Kenneth R. Ginsburg, "The importance of play in promoting healthy child development and maintaining strong parent-child bonds", *Pediatrics*, vol. 119, No. 1 (2007), pp. 182–191.

169 Aurora P. Jackson and others, "Single mothers in low-wage jobs: financial strain, parenting, and preschoolers' outcomes", *Child Development*, vol. 71, No. 5 (2000), pp. 1409–1423.

170 Gary W. Evans, "The environment of childhood poverty", *American Psychologist,* vol. 59, No. 2 (2004), pp. 77–92.

171 Rena L. Repetti, Shelley E. Taylor and Teresa E. Seeman, "Risky families: family social environments and the mental and physical health of offspring", *Psychological Bulletin*, vol. 128, No. 2 (2002), pp. 330–366.

172 H. Meltzer and others, "Victims of bullying in childhood and suicide attempts in adulthood", *European Psychiatry*, vol. 26, No. 8 (2011), pp. 498–503.

173 Nada and Suliman, "Violence, abuse, alcohol and drug use, and sexual behaviors in street children of Greater Cairo and Alexandria, Egypt".

174 Gary W. Evans, John Eckenrode and Lyscha A. Marcynyszyn, "Chaos and the macrosetting: the role of poverty and socioeconomic status", in *Chaos and its Influence on Children's Development: An Ecological Perspective*, Gary W. Evans and Theodore D. Wachs, eds. (Washington, D.C., American Psychological Association, 2010), pp. 225–238.

175 Karol L. Kumpfer and others, "Cultural adaptation process for international dissemination of the strengthening families program", *Evaluation and the Health Professions*, vol. 31, No. 2 (2008), pp. 226–239.

176 Angela Hudson and Karabi Nandy, "Comparisons of substance abuse, high-risk sexual behavior and depressive symptoms among homeless youth with and without a history of foster care placement", *Contemporary Nurse*, vol. 42, No. 2 (2014), pp. 178–186.

TABLE 3 Summary of substance use stages and associated mental and physical health conditions, by life

Substance	Physical/medical conditions	Mental health/ psychiatric disorders
Adolescence		
Alcohol Cannabis Tobacco Inhalants Psychotherapeutic drugs • Amphetamines • Opioids/pain relievers	Accidental injury • Automobile • Accidents Physical/sexual violence Poisoning/overdose Sexually transmitted diseases Respiratory problems • Asthma Pain-related diagnoses	Suicidal ideation/behaviours Internalizing disorders • Depression • Anxiety Externalizing disorders • Oppositional defiant disorder • Attention deficit/hyperactivity disorder • Conduct disorder
Adulthood		
Alcohol Cannabis Tobacco Psychotherapeutic drugs • Opioids/pain relievers • Tranquillizers/benzodiazepines Cocaine/"crack" Heroin Methamphetamine	Poisoning/overdose Sexually transmitted diseases Cancers Heart disease/hypertension/stroke Reproductive morbidity/fetal damage Diabetes Respiratory problems • Asthma • Infection Liver damage/disease	Suicidal ideation/behaviours Mood disorders • Depression • Bipolar I and II Anxiety disorders • Panic disorder • Post-traumatic stress disorder • Social and specific phobias • Generalized anxiety disorder Antisocial personality disorder
Older Adulthood		
Alcohol Psychotherapeutic drugs • Opioids/pain relievers • Sedatives/benzodiazepines • Amphetamines Cannabis Tobacco	Accidental injury Cirrhosis Heart attack/stroke Insomnia Cancers Diabetes	Suicidal ideation/behaviours Depression/bereavement Anxiety disorders • Social and specific phobias • Generalized anxiety disorder Dementia/Wernicke-Korsakoff Syndrome Insomnia

Source: T. M. Schulte and Y. Hser, "Substance use and associated health conditions throughout the lifespan", *Public Health Review*, vol. 35, No. 2 (2014).

of differential access to basic needs such as adequate nutrition, quality housing and schools, as well as increased exposure to environmental toxins and hazards. Poor access to services and social support and a lack of collective neighbourhood efficacy compound the problem.[177, 178] Adding to the challenge is the lack of effective coping strategies that often characterize disadvantaged children. These problems tend to be compounded in individuals with refugee or immigrant status.[179] A range of substance use was described in the 1990s in different settings among young people and adults with refugee status: khat chewing among conflict-affected Somali refugees, opioid use among Afghan refugees in Iran (Islamic Republic of) and Pakistan, non-medical use of benzodiazepines among displaced people in Bosnia and Herzegovina an use of methamphetamine among refugees from Myanmar in Thailand.[180]

Consequences for young people who use drugs

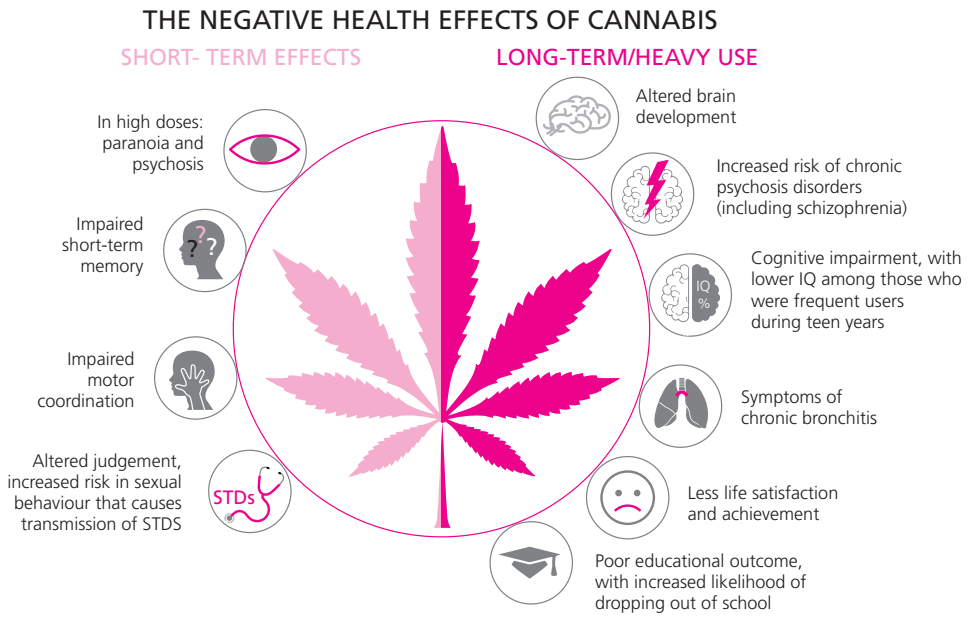
Research on substance use among adolescents and young adults suggests that chronic use of substances

177 Candice L. Odgers and others, "Supportive parenting mediates widening neighborhood socioeconomic disparities in children's antisocial behavior from ages 5 to 12", *Development and Psychopathology*, vol. 24, No. 3 (2012), pp. 705–721.

178 Fay Saechao and others, "Stressors and barriers to using mental health services among diverse groups of first-generation immigrants to the United States", *Community Mental Health Journal*, vol. 48, No. 1 (2012), pp. 98–106.

179 India J. Ornelas and Krista M. Perreira, "The role of migration in the development of depressive symptoms among Latino immigrant parents in the USA", *Social Science and Medicine*, vol. 73, No. 8 (1982), pp. 1169–1177.

180 Nadine Ezard and others, "Six rapid assessments of alcohol and other substance use in populations displaced by conflict", *Conflict and Health*, vol. 5, No. 1 (2011).



Source: Nora D. Volkow and others, "Adverse health effects of marijuana use", *New England Journal of Medicine*, 370(23) (2014), pp. 2219–2227.

is associated with deficits in domains including physical health, cognitive functioning, educational achievement and psychology, as well as overall impairment in social competencies and relationships.[181] Physical health problems experienced by young drug users most obviously include increased risk of overdose, accidental injury such as motor vehicle accidents or falls, and attempted suicide. A large, national study of 856,385 people who were admitted for drug use disorders into publicly funded treatment facilities in the United States showed that 28 per cent of the respondents had psychiatric comorbidity.[182] Regular substance use can also profoundly impact neurodevelopment, which can interfere with academic performance and cognitive functioning during adolescence and lead to dysfunction in the social and employment realms later in life.[183]

Although many of these health problems are clearly a result of substance use, other problems, such as cognitive deficits and mental health disorders in chronic users, may have preceded substance use, even though they are often referred to as consequences. Disentangling the antecedents from the consequences of substance use represents one of the most fundamental challenges in the field, with the greatest implications for prevention of substance use in adolescence.

Nevertheless, substance use among teenagers, in particular young teenagers, is of particular concern given the evidence that substances with psychoactive effects have a greater impact on adolescents than adults.[184] Age-related variations in drug responses are likely to be the result of differences in the pharmacological effects of substances on the brain systems, such as the mesolimbic dopamine system, that are still under construction. These differences may have significant implications for adolescents who exhibit reduced sensitivity to various

181 Robert J. Johnson and Howard B. Kaplan, "Stability of psychological symptoms: drug use consequences and intervening processes", *Journal of Health and Social Behavior*, vol. 31, No. 3 (1990), pp. 277–291.

182 Noa Krawczyk and others, "The association of psychiatric comorbidity with treatment completion among clients admitted to substance use treatment programs in a U.S. national sample". *Drug and Alcohol Dependence*, vol. 175 (June 2017), pp. 157–163.

183 Kim T. Mueser and others, "Antisocial personality disorder in people with co-occurring severe mental illness and substance use disorders: clinical, functional, and family relationship correlates", *Psychosis*, vol. 4, No. 1 (2012), pp. 52–62.

184 Nicole L. Schramm-Sapyta and others, "Are adolescents more vulnerable to drug addiction than adults? Evidence from animal models", *Psychopharmacology*, vol. 206, No. 1 (2009), pp. 1–21.

substances, increasing the tendency to consume greater amounts and more drug types, thereby compromising their neurodevelopment.[185]

Although there have been claims that chronic substance use may permanently damage the brain, the evidence from human studies is equivocal.[186] This inconclusiveness may be due in part to the methodologies that have been employed to assess the possible developmental consequences of substance use. Nevertheless, the literature suggests that there may be a dose-response relationship between substance use and cognitive deficits, providing some support for substance-induced alterations, in particular in memory, attention and executive functions.[187] Studies that have included individuals who initiate substance use during adolescence show persistent deficits into adulthood, with reported cognitive decline 10 years later, even in those who had quit, but more so for those who continued to use drugs.[188]

Of increasingly greater concern is that the use of multiple substances — polysubstance use — is widespread and represents a major challenge to prevention and treatment efforts. Polydrug use confers greater health risks and negative consequences, as well as poorer outcomes of interventions among users.

The direct effects of harmful substance use on the adolescent brain dynamically interact with the social and environmental contexts to which users are exposed, increasing the risk of poor outcomes in numerous functional domains. Unemployment, physical health problems, dysfunctional social relationships, susceptibility to accidents, suicidal tendencies and behaviours, mental illness and even lower life expectancy are all increased by substance use in adolescence, particularly when continued into adulthood.[189, 190] Harmful use of substances influences all the people in an individual's life, as well as society more broadly through the associated costs of their social, physical and mental health problems.[191] The cumulative and interactive consequences of harmful drug use further undermine young people's socioeconomic standing, the quality of the parenting they provide, their ability to develop positively supportive relationships and their ability to maintain employment, which further reinforces their substance use.[192]

Consequences for children and adolescents of substance use by caregivers

Children and adolescents whose caregivers have substance use disorders are significantly compromised in terms of their safety, mental and physical health, and school readiness.[193, 194] They can be directly exposed to dangerous substances, and the ability of caregivers to adequately supervise and nurture their development can be compromised as a result of drug use disorders. Children affected by the harmful use of substances by their parents exhibit higher levels of externalizing symptoms such as attention-deficit hyperactivity disorder or antisocial personality disorder and of internalizing symptoms such as depression, anxiety or post-traumatic stress disorder, which are key risk factors for adverse developmental trajectories.[195] As they approach adolescence, chil-

185 Ibid.

186 Nadia Solowij and Robert Battisti, "The chronic effects of cannabis on memory in humans: a review", *Current Drug Abuse Reviews*, vol. 1, No. 1 (2008), pp. 81–98.

187 Thomas Lundqvist, "Cognitive consequences of cannabis use: comparison with abuse of stimulants and heroin with regard to attention, memory and executive functions", *Pharmacology Biochemistry and Behavior*, vol. 81, No. 2 (2005), pp. 319–330.

188 Karel L. Hanson and others, "Impact of adolescent alcohol and drug use on neuropsychological functioning in young adulthood: 10–year outcomes", *Journal of Child and Adolescent Substance Abuse*, vol. 20, No. 2 (2011), pp. 135–154.

189 Dieter Henkel, "Unemployment and substance use: a review of the literature (1990–2010)", *Current Drug Abuse Reviews*, vol. 4, No. 1 (2011), pp. 4–27.

190 WHO, Health for the world's adolescents: a second chance in the second decade. Available at http://apps.who.int/adolescent/second-decade.

191 Steve Sussman, Silvana Skara and Susan L. Ames, "Substance abuse among adolescents", *Substance Use and Misuse*, vol. 43, Nos. 12 and 13 (2008), pp. 1802–1828.

192 "Comorbidity: addiction and other mental illnesses".

193 Sonja Bröning and others, "Selective prevention programs for children from substance-affected families: a comprehensive systematic review", *Substance Abuse Treatment, Prevention, and Policy,* vol. 7, No. 23 (2012).

194 Center for Children's Justice, "Pennsylvania's heroin and opioid 'epidemic' jeopardizes early childhood", Children's justice and advocacy report, 2016. Available at www.c4cj.org.

195 Ricardo Velleman and Lorna Templeton, "Understanding and modifying the impact of parents' substance misuse on children", *Advances in Psychiatric Treatment*, vol. 13, No. 2 (2007), pp. 79–89.

dren exposed to a caregiver's harmful substance use more often exhibit early onset of substance use themselves,[196, 197] earlier episodes of drunkenness,[198] more binge drinking[199] and a much greater likelihood of developing substance use disorders at a younger age than their counterparts.[200] In effect, exposure to a caregiver's harmful substance use places children's ability to meet developmental milestones in jeopardy. They face a significantly heightened risk of academic failure, severe behavioural and mental health problems, criminality and inability to enter the workforce.[201, 202, 203]

In part, the relationship between harmful use of substances by a parent and the substance use outcomes of a child are mediated by parental neglect,[204] which biases the developmental trajectory toward these outcomes. The risk is transmitted through both the direct effects of neglectful and poor parenting and prevailing living circumstances, such as unsupportive interpersonal relationships and disorganized households.

Another interrelated factor is the co-occurrence of mental health disorders in individuals who have a substance use disorder, which further hinders the ability of caregivers to adequately parent and provide support for healthy child development.[205, 206] Such situations have repeatedly been shown to be a strong predictor of substance use in adolescence among the children of affected individuals.[207, 208]

Further compounding the problem is the high prevalence of maltreatment, poverty, community violence and substandard housing conditions experienced by children whose caregivers suffer from drug use disorders, although this scenario is not universal.[209] The psychological trauma of exposure to such conditions has as profound an impact as the harm to the physical health of children of individuals who have substance use disorders. The most frequent and long-term addiction-related mental and behavioural health problems developed by children include post-traumatic stress disorder, depression, anxiety, externalizing behaviours such as aggression, harmful use of substances and many other maladaptive reactions.

Another common feature of harmful use of substances by parents is prenatal exposure to substances, which is considered as both a direct and a mediating mechanism. Prenatal and early exposure to cigarette smoke has been shown to increase children's propensity to smoke, become dependent on nicotine and exhibit externalizing behaviours, such as conduct problems (e.g., aggression), and internalizing

196 Geary S. Alford, Ernest N. Jouriles and Sara C. Jackson, "Differences and similarities in the development of drinking behavior between alcoholic offspring of alcoholics and alcoholic offspring of nonalcoholics", *Addictive Behavior*, vol. 16, No. 5 (1991), pp. 341–347.

197 Emily F. Rothman and others, "Adverse childhood experiences predict earlier age of drinking onset: results from a representative US sample of current or former drinkers", *Pediatrics*, vol. 122, No. 2 (2008), pp. 298–304.

198 Thomas McKenna and Roy Pickens, "Alcoholic children of alcoholics", *Journal of Studies on Alcohol and Drugs*, vol. 42, No. 11 (1981), pp. 1021–1029.

199 Elissa R. Weitzman and Henry Wechsler, "Alcohol use, abuse and related problems among children of problem drinkers: findings from a national survey of college alcohol use", *Journal of Nervous and Mental Disease*, vol. 188, No. 3 (2000), pp. 148–154.

200 Andrea Hussong, Daniel Bauer and Laurie Chassin, "Telescoped trajectories from alcohol initiation to disorder in children of alcoholic parents", *Journal of Abnormal Psychology*, vol. 117, No. 3 (2008), pp. 63–78.

201 Dennis C. Daley, "Family and social aspects of substance use disorders and treatment", *Journal of Food and Drug Analysis*, vol. 21, No. 4 (2013), pp. S73–S76.

202 Jeanne Whalen, "The children of the opioid crisis", *Wall Street Journal*, updated 15 December 2006.

203 Chris Elkin, "Born to do drugs: overcoming a family history of addiction", 10 February 2016. Available at www.drugrehab.com.

204 Marija G. Dunn and others, "Origins and consequences of child neglect in substance abuse families", *Clinical Psychology Review*, vol. 22, No. 7 (2002), pp. 1063–1090.

205 Kimberlie Dean and others, "Full spectrum of psychiatric outcomes among offspring with parental history of mental disorder", *Archives of General Psychiatry*, vol. 67, No. 8 (2010), pp. 822–829.

206 Kathleen R. Merikangas, Lisa C. Dierker and Peter Szatmari, "Psychopathology among offspring of parents with substance abuse and/or anxiety disorders: a high-risk study", *Journal of Child Psychology and Psychiatry*, vol. 39, No. 5 (2003), pp. 711–720.

207 S. N. Madu and M. P. Matla, "Correlations for perceived family environmental factors with substance use among adolescents in South Africa, *Psychological Reports*, vol. 92, No. 2 (2003), pp. 403–415.

208 D. De Micheli and M. L. Formigoni, "Are reasons for the first use of drugs and family circumstances predictors of future use patterns?", *Addictive Behaviors*, vol. 27, No. 1 (2002), pp. 87–100.

209 Child Welfare Information Gateway, "Parental substance use and the child welfare system", Bulletins for Professionals Series (October 2014). Available at www.childwelfare.gov.

symptoms, such as depression and anxiety.[210, 211] Prenatal drug and alcohol exposure are associated with subsequent behavioural problems in childhood and adolescence, including eventual substance use and harmful use of substances.[212, 213] Alterations associated with self-regulation, reward and motivation in the neurological systems of a fetus, caused by the properties of the substance or substances used by pregnant women, appear to be how prenatal substance exposure affects children. The effects of these sorts of prenatal exposure on mental health and behaviour will tend to exacerbate any pre-existing susceptibilities to substance use and to developing substance use disorders.

Understanding differential pathways to substance use and implications for prevention and policy

It is well known that individuals who experience adversity as children have a higher risk of developing drug use disorders as adults.[214] The current misconception that individuals are equally vulnerable to substance use and harmful use ignores the scientific evidence that has consistently shown individual differences in propensity. These widespread beliefs hinder the application of effective and targeted solutions. The multiple life-course conditions that influence whether an individual will develop a serious problem with substances are alterable and, in many cases, preventable. Protective conditions can be strengthened, while detrimental factors can be attenuated or even prevented.

210 Marie D. Cornelius and others, "Long-term effects of prenatal cigarette smoke exposure on behavior dysregulation among 14-year-old offspring of teenage mothers", *Maternal and Child Health Journal*, vol. 16, No. 3 (2012), pp. 694–705.

211 Brian J. Piper and Selena M. Corbett, "Executive function profile in the offspring of women that smoked during pregnancy", *Nicotine and Tobacco Research*, vol. 14, No. 2 (2012), pp. 191–199.

212 Jennifer A. DiNieri and others, "Maternal cannabis use alters ventral striatal dopamine D2 gene regulation in the offspring", *Biological Psychiatry*, vol. 70, No. 8 (2011), pp. 763–769.

213 Thitinart Sithisarn, Don T. Grangerand and Henrietta S. Bada, "Consequences of prenatal substance use", *International Journal of Adolescent Medicine and Health*, vol. 24, No. 2 (2011), pp. 105–112.

214 Diana H. Fishbein and Ty A. Ridenour, "Advancing transdisciplinary translation for prevention of high-risk behaviors: introduction to the special issue", *Prevention Science*, vol. 14, No. 3 (2013), pp. 201–215.

Young people and the supply chain

Young people can be affected not only by drug use but also by illicit crop cultivation, drug production and trafficking in drugs. Exposure to these different activities can have equally long-term implications for young people and their future prospects. Some of these activities are discussed in the present subsection.

Information on the involvement of young people in the drug supply chain is limited and, in most instances, is restricted to media reports. Consequently, media sources, in addition to other reports, have been used to highlight issues on young people in place of evidence purely from research.

Illicit crop cultivation and drug manufacture

Opium poppy cultivation

Afghanistan continues to be the world's largest opium producer, where insurgent groups such as the Taliban have been able to generate significant revenue by taxing drugs passing through the regions they control.[215] Media outlets have reported that independent young farmers witnessing the lucrative business have also attempted to participate in this "profitable trade".[216] Boys as young as 6 work in the fields, harvesting the opium poppy and collecting the opium that will be used to produce heroin. Some cases have been reported of farmers who, unable to pay back loans taken to cultivate opium, turn to arranged child marriage. In such cases, families offer their daughters to be married, often to older men or to live far away from the support network they grew up with, as payment or simply because they can no longer support them financially.[217]

In Myanmar, some 1.3 million children under the age of 14 are thought to be child labourers, according to statistics from the Ministry of Labour, Immigration and Population and reported in the

215 United States, Department of State, *International Narcotics Control Strategy Report 2017*, vol. I, *Drug and Chemical Control*, (Washington D.C., March 2017), pp. 90–91.

216 Franz J. Marty, "Afghanistan's Opium Trade: A Free Market of Racketeers", *The Diplomat*, 19 July 2017.

217 Fariba Nawa, *Opium Nation: Child Brides, Drug Lords, and One Woman's Journey Through Afghanistan*, (New York, Harper Perennial, 2011).

media.[218] Some of the reported occupations of child labourers include drug production and trafficking. A ripple effect on the education of these children is likely, as parents usually consider a basic level of literacy and numeracy to be sufficient.[219]

Within the last decade, drug cartels and organized crime groups in Mexico have increasingly displaced indigenous people not only from their land but also from their community networks.[220] Many reports have noted that children and young people in certain areas were being kidnapped and forced to work in opium poppy cultivation, production and trafficking by organized crime groups.[221, 222, 223]

Coca bush cultivation

In Colombia, children between 6 and 13 who lived in places affected by the armed conflict in coca regions were often used as labour in the fields. At the beginning of the 2010s, it was estimated that there were about 18,000 children and teenagers in illegal armed groups in Colombia and at least 100,000 in sectors of the illegal economy directly controlled by those groups.[224] Most of those young people were recruited before the age of 12, were affected by poverty and came from regions affected by violence. Some of those children grew up working with their parents in the coca harvest and in coca paste distribution.[225]

A significant number of teenage and young workers, called *raspachines*, are responsible for coca leaf collection in Bolivia (Plurinational State of), Colombia and Peru. Young people from the Andean region, many of them indigenous, leave their families and communities to find food, clothing, transportation and entertainment. Wages in coca leaf collection are substantially higher than the average for agricultural work. Many of them are children of landless peasants and lack the education and opportunities that would normally allow them greater stability and socioeconomic development. These young people are the weakest link in the chain formed by the agro-industrial system of coca. Given that juveniles are unlikely to be held accountable for their crimes, they are increasingly exposed to high-risk work such as buying and transporting coca paste.[226, 227]

Cannabis farms

Research on youth involvement in cannabis cultivation is limited and concentrated in a few Western countries. Given that cannabis is cultivated in virtually every country, this evidence may mask different global patterns. In Canada, Ireland and the United Kingdom, the number of cannabis-growing operations, known as grow-ops, has increased considerably in the past few years.[228, 229, 230] Media outlets have reported that young people in the United Kingdom, mostly trafficked from countries in Asia, are recruited to work for the criminal organizations running these farms.[231] They are often locked up alone and forced to tend plants in converted houses, usually in extremely dangerous conditions. Among the risks mentioned are injury or even death from dangerous equipment, fire, respiratory illness from mould, electrocution and violence due to burglaries and turf wars between the organizations running the grow-ops.

218 Hoogan, "Too young to toil".

219 Ibid.

220 Alejandra S. Inzunza and José Luis Pardo, "Cartels are displacing an indigenous group that's lived in this Mexican state for centuries", *Vice News*, 20 May 2016.

221 Convention on the Rights of the Child, *Concluding observations on the combined fourth and fifth periodic reports of Mexico*, CRC/C?MEX/CO/4.5

222 Mexico, Gaceta Parlamentaria, año XVI, número 3757-IX, jueves 25 de abril de 2013.

223 Inter-American Commission on Human Rights, *Situation of human rights in Mexico,* Organization of American States, December 2015.

224 Natalia Springer, *Como corderos entre lobos: del uso y reclutamiento de niñas, niños y adolescentes en el marco del conflicto armado y la criminalidad en Colombia* (Bogotá, Springer Consulting Services, 2012), pp. 20–30.

225 Ibid.

226 Juan G. Ferro and others, *Jóvenes, coca y amapola: un estudio sobre las transformaciones socioculturales en zonas de cultivos ilícitos* (Bogotá, Universidad Javeriana, 1999), p. 20.

227 Colombia, Programa Nacional Integral de Sustitución de Cultivos Ilícitos, decree No. 896 of 29 May 2017.

228 Sue Reed, "Vietnamese child slaves working in UK cannabis factories", *Daily Mail*, 17 December 2017.

229 Migrant Rights Centre Ireland, "Trafficking for forced labour in cannabis production: the case of Ireland" (Dublin, 2015).

230 Susan C. Boyd and Connie I. Carter, *Killer Weed: Marijuana Grow Ops, Media and Justice* (Toronto, Canada, University of Toronto Press, 2014), pp. 167–180.

231 Reed, "Vietnamese child slaves working in UK cannabis factories".

Media outlets have also reported that immigrants often enter the United Kingdom with no intention of cultivating cannabis. However, commercial cannabis cultivation offers itself as the obvious choice for immigrants to pay back large debts to lenders who threaten their families back home.[232] When cannabis farms are raided, these youth workers may be prosecuted, convicted and eventually imprisoned for crimes they may have been forced to commit, while their traffickers may evade justice.[233]

Manufacture of synthetic drugs

Europe remains the most dynamic market for synthetic drugs such as MDMA, amphetamine and, to a lesser extent, methamphetamine, and organized crime groups in the region are involved in the manufacture of those drugs.[234] In Europe, the number of home-based laboratories operated by criminal groups has increased in the last decade, in particular those for the production of methamphetamine in Czechia and for MDMA in the Netherlands.[235] In Asia, criminal syndicates capitalize on the limited capacity of law enforcement to police drug manufacturing, which exposes local communities to the illegal drug industry. Inevitably, children and young people within those communities become involved in the production and supply chain of drugs.[236]

In the United States, most of the domestic laboratories seized in 2016 were small-capacity covert production laboratories known as "one-pots" or manufacturing sites known as "shake and bakes". They can be set up anywhere: in private residences, motel and hotel rooms, trailers, campgrounds and commercial establishments.[237] Children who live at these sites, visit them or are present during drug manufacture may run acute health and safety risks.[238] The age-related behaviours of young children, such as frequent hand-to-mouth contact and physical contact with their environment, increase the likelihood that they will inhale, absorb or ingest toxic chemicals, drugs or contaminated food.[239]

In Australia, crystalline methamphetamine is manufactured and distributed by local motorcycle gangs that work with major organized crime groups. These groups often recruit children aged between 11 and 15 to cook the substance and target potential young users in country towns.[240] Between 2006 and 2010 in New Zealand, police found 384 children in 199 laboratories, and convictions for neglect or abuse were obtained for people in 19 laboratories. In those cases, drug paraphernalia was stored in children's lunch boxes and drinking bottles.[241] Since 2012, the number of minors, with an average age of 6 years, found in methamphetamine laboratories in New Zealand has increased, according to the National Drug Intelligence Bureau.[242]

Young people in the drug trafficking chain

Young people can become entangled in drug trafficking in both the local and international drug markets. However, the available evidence regarding young people's involvement in drug trafficking is limited to a few countries and comes from a limited number of studies.

At times, young people's place of birth, as well as their socioeconomic environment, determines how they evolve inside criminal organizations. Beyond exploitation, there are several reasons why a young person may participate in drug dealing and trafficking. They may do so as an aspirational financial

232 Amelia Gentleman, "Trafficked and enslaved: the teenagers tending UK cannabis farms", *The Guardian*, 25 March 2017.

233 "Trafficking for forced labour in cannabis production".

234 Europol, "Business fundamentals: how illegal drugs sustain organised crime in the EU" (2017).

235 EMCDDA, *European Drug Report 2017: Trends and Developments*, (Luxembourg, Publications Office of the European Union, 2017).

236 Fifa Rahman and Nick Crofts, eds., *Drug Law Reform in East and Southeast Asia* (Plymouth, United Kingdom, Lexington Books, 2013), pp. 157–159.

237 United States, Department of Justice, Drug Enforcement Administration, *2017 National Drug Threat Assessment* (Washington, D.C., 2017).

238 Ibid.

239 Karen Swetlow, "Children at clandestine methamphetamine labs: helping meth's youngest victims", OVC Bulletin June 2003 (United States Department of Justice, Office of Justice Programs, Office for Victims of Crime).

240 Caro Meldrum-Hanna, "Crystal meth: former drug lab cook recruited at age 11 as outlaw motorbike gangs push drugs in rural towns", *Four Corners*, 20 October 2014.

241 "Children raised in meth labs", *New Zealand Herald*, 2 June 2013.

242 New Zealand Police Association, "Meth Kids", (2013) vol. 46, No.2. Available at https://www.policeassn.org.nz/news-room/publications/featured-articles/meth-kids.

measure or as part of their family's established economic activities. In other cases, socioeconomic disadvantage is thought to place young people at increased risk of drug dealing in order to survive in an environment of limited opportunities.[243] Most studies in the United States identify participants who deal drugs as a means to seek economic gain to supplement meagre wages. Young people are also involved in the illicit drug trade to obtain easy access to drugs or because of parental drug use or dealing. Carrying or accessing guns has also been identified as a variable that could lead adolescents to drug dealing.[244] Although the definition of minors and juveniles differs across countries, minors and juveniles are subject to lenient laws, prosecution and penalties for criminal offences (compared with adults), including drug offences, which makes it convenient for organized crime groups to exploit young people to undertake various tasks within the drug supply chain.

Drug dealing in local markets that are non-violent or have a low level of violence

In many places, local-level drug transactions tend to occur in contexts that have a low level of violence or that are non-violent. For example, in Estonia, the most widespread reasons for children becoming involved in drug dealing include the influence of close friends and peers, the desire to become rich, a lack of an alternate income and the need for free drugs.[245] In the United Kingdom, the number of children under the age of 16 arrested on suspicion of supplying "crack" cocaine, heroin or cocaine has been increasing in recent years.[246] Drug traffickers perceive children as cheap, expendable, easily controlled and often able to operate under the police's radar. Informal groups known as "county lines", which are not necessarily affiliated as gangs, have been shown to supply drugs from an urban hub to local markets in the United Kingdom.[247] Such a phenomenon includes the forced recruitment of young people, many aged between 13 and 18, who may have accumulated drug debts. Most recruits work in remote areas for these groups as street dealers or runners, or by arranging accommodation, hiring cars or booking train tickets, among other minor activities. In this manner, the group exploits young or vulnerable people to achieve the storage or supply of drugs, movement of cash proceeds and to secure the use of dwellings. Group leaders or individuals exploited by them regularly travel between the urban hub and the county market to replenish stock and deliver cash.

Victims may not wish to continue working for county lines, but are afraid of self-incrimination or retribution. They are exposed to varying levels of exploitation, including physical, mental and sexual harm, sometimes over protracted periods. Some vulnerable individuals are also trafficked into remote markets to work and others have their homes taken over (a process known as being "cuckooed") through force or coercion. Many children are also lured by the promise of earnings and valuable assets. The use of social media to recruit members is also reported, and young women are often involved in recruiting other young women who may be vulnerable and in crisis.[248]

Drug dealing in local markets in violent contexts

In local contexts where violence prevails, drug markets may directly harm all actors involved in drug-related activities, including young people.[249]

In Brazil, teenagers and young adults who work within drug supply networks are often looking for excitement and a means to identify with local groups or gangs. They also want to consume the illegal drugs that they sell or traffic. Officials tend to ascribe

243 Leah J Floyd and others, "Adolescent drug dealing and race/ethnicity: a population-based study of the differential Impact of substance use on involvement in drug trade", *American Journal of Drug and Alcohol Abuse*, vol 36, No.2 (2010), pp.87–91.

244 Tatiana Starr Daniels, "What influences some black males to sell drugs during their adolescence", *McNair Scholars Journal*, vol. 13, (Sacramento, California State University, 2012), pp. 21–39.

245 Nelli Kalikova, Aljona Kurbatova and Ave Talu, *Estonia Children and Adolescents Involved in Drug Use and Trafficking: A Rapid Assessment*, (Geneva, International Labour Organization, International Programme on the Elimination of Child Labour, 2002).

246 Adam Lusher, "Gangs recruiting children as young as 12 as class A drug dealers", *The Independent*, 14 July 2017.

247 United Kingdom, National Crime Agency, "County lines violence, exploitation and drug supply 2017: national briefing report" (November 2017).

248 Ibid.

249 Thomas Babor and others, *Drug Policy and the Public Good* (Oxford, Oxford University Press, 2010).

structural factors that are exacerbated by a lack of financial resources or frail family structures to children's attraction to gangs and drug trafficking.[250]

Organized crime groups and gangs prefer to recruit children and young adults for drug trafficking for two reasons. The first is the recklessness associated with this age group, even when they are faced with police or rival gangs, and the second is their obedience in carrying out orders. The desire to belong to a gang and to be highly regarded by its members imparts to the children a sense of obedience and a strong will to obey orders from and the rules of their gang.[251] In Argentina, the selling of drugs in deprived areas is done by a method known as *menudeo*, by which drugs are dispensed from bunkers (small windowless buildings) staffed by a gang member, often a teenager, or even a child. Often, an armed *soldado* (guard) is on the payroll of the local trafficker guards the area.[252]

International markets

Young people involved in the illicit drug trade in international markets are often part of large organized crime groups. They are used in different ways for smuggling illegal substances across borders. In the United States, gangs target young people who can legally cross international borders,[253] while in Peru, *mochileros* (backpackers) travel with illicit cargo of cocaine to secret stash points.[254] Drug bosses usually use children as lookouts at control points or border check posts.

On the United States-Mexico border, many young people are involved in drug trafficking, serving as so-called "mules", to carry drugs across the border. Trafficking groups target young people who can legally cross the border because they are United States citizens who may live in Tijuana and go to school in the United States or possess a border crossing card. In 2013, 118 young people were caught smuggling cannabis, methamphetamine, heroin and cocaine through the San Diego sector. By 2015, that number had dropped to 70. This decline may be attributed to several factors, including tighter border security, but the numbers only reflect those who were caught and not those who were successful in crossing the border.[255, 256]

The phenomenon of young people crossing borders to smuggle drugs occurs in most regions of the world. In Peru, media sources suggest that young people help to transport cocaine from the valley of three rivers — the Apurimac, Ene and Mantaro — to secret stash points or clandestine airstrips, from where the drugs are moved on by other means. Children and teenagers are the principal workers in the cocaine valley, where backpackers or *mochileros* walk for more than 100 miles through the mountains to avoid police checkpoints and armed gangs.[257] Although the journey is long and dangerous, the payments make it lucrative, with every trip worth about $2,000.[258] The *mochileros* are reportedly well organized and prepared for attacks, either from rival groups or the police.

Over the past five years, the number of ethnic minority juveniles engaging in drug trafficking on the border between the Lao People's Democratic Republic and Viet Nam has also increased, according to media sources.[259] Suggestions were made that about 20 young people smuggled drugs across the border every day in 2017.[260]

In recent decades, West Africa has emerged as a major transit point for drug trafficking; according to media sources, this has also increased the level of

250 Jailson de Souza e Silva and André Urani, *Brazil Children in Drug Trafficking: A Rapid Assessment*, Investigating the Worst Form of Child Labour No. 20 (Geneva, International Labour Organization, 2002).

251 Ibid.

252 Mauro Testa and Ross Eventon, "Vulnerable youth and drug trafficking in Rosario, Argentina: between stigmatisation and social control" (Swansea, United Kingdom, Global Drug Policy Observatory, Swansea University, February 2016).

253 Greg Moran, "There has been some progress, but youth drug smuggling persists at the U.S-Mexico border", *Los Angeles Times*, 20 June 2016.

254 "A look at children's role in cocaine production in Peru", published on YouTube by AJ+ on 7 May 2015.

255 Moran, "There has been some progress, but youth drug smuggling persists at the U.S-Mexico border".

256 "Mexico drug gangs using more children as 'mules'", *CBS News*, 14 March 2012.

257 "A look at children's role in cocaine production in Peru".

258 Linda Presley, "The mochileros: high stakes in the high Andes–the young backpackers risking their lives in cocaine valley", *BBC News*, 24 November 2015.

259 Juvenile drug traffickers multiply at Vietnam-Lao border", *Voice of Vietnam*, 27 October 2017.

260 Ibid.

exploitation of young people.[261] Media sources reported that, in 2016, 158 young Nigerians were awaiting execution for drug offences in China, Indonesia, Malaysia and Singapore. Some had claimed to be university students and were colluding with drug traders to undermine the visa system and gain entrance into Malaysia, Indonesia, Thailand or other countries on drug trafficking routes.[262]

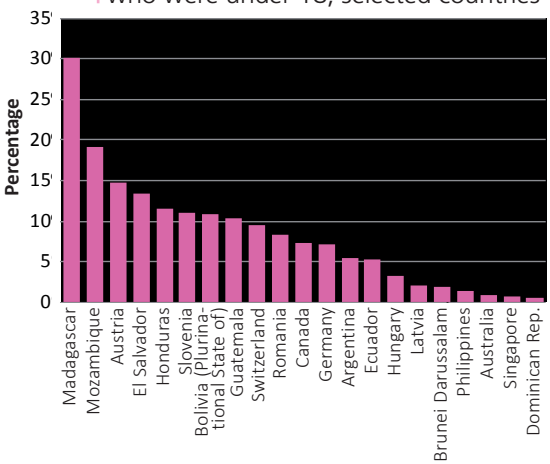
What is the role of children and street gang members in trafficking drugs?

Drug-related violence, street gangs and exploitation of children by organized crime groups in the drug trade are some of the main concerns of drug policies all over the world. Using data from over 40 countries, about 3 per cent of people arrested or cautioned for possession of drugs in 2015 were aged under 18).[263, 264] For more serious drug offences, such as sales, only 1 per cent of those arrested or prosecuted were children. Globally, children represent about one third of the global population,[265] so children are much less likely than adults to be arrested or prosecuted for drug offences.

Nevertheless, this represents almost 70,000 children arrested for drug possession and over 17,000 arrested for serious drug offences in 2015. The share of children among those arrested for drug offences varies considerably between countries. In general, children represent a larger share of those arrested for possession than for serious offences. Some countries report that more than 10 per cent of people arrested for drug possession are children, but most countries report that fewer than 5 per cent of drug traffickers are under 18.

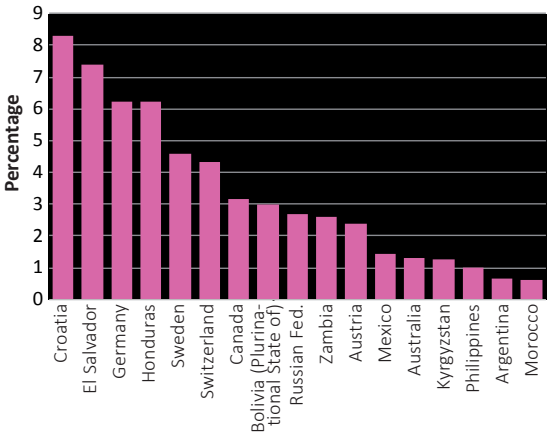
Children may participate in drug markets through an organized group, such as a street gang. The International Classification of Crime for Statistical Purposes defines a gang as "a group of persons that is defined by a set of characteristics including durability over time, street-oriented lifestyle, youthfulness of members, involvement in illegal activities and group identity."[266] "Youthfulness" in this context should be interpreted liberally, since a number of studies indicate that most street gang members appear to be adults.[267] Nonetheless, there is well-

FIG. 10 Proportion of people arrested or cautioned for drug possession in 2015 who were under 18, selected countries



Source: UNODC, responses to the annual report questionnaire.

FIG. 11 Proportion of people arrested or cautioned for serious drug offences in 2015 who were under 18, selected countries



Source: UNODC, responses to the annual report questionnaire.

261 "Narcotics in Africa: an emerging drug market", *The Economist* (Nairobi), 14 April 2016.

262 Ismael Mudashir, "Drug trafficking: 158 Nigerians on death row in China, Malaysia", *Daily Trust*, 1 March 2016.

263 According to the United Nations Convention on the Rights of the Child, adulthood starts at 18 years of age.

264 United Nations, *Treaty Series*, vol. 1577, No. 27531.

265 United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2017. Available at https://esa.un.org/unpd/wpp.

266 UNODC, *International Classification of Crime for Statistical Purposes*, version 1.0 (March 2015), p. 98.

267 For example, the National Youth Gang Survey in the United States suggests that more than two thirds of urban street gang members are adults. See National Gang Center, National Youth Gang Survey Analysis, Demographics: age of gang member. Available at www.nationalgangcenter.

Street gangs and drug trafficking

It has been alleged that street gang members, particularly those involved in "mega-gangs" like Mara Salvatrucha, are involved in international drug trafficking. Individual gang members may move on to become drug traffickers, of course, and the skills they acquire in gang activity may prove useful in their new occupation. But there are several reasons to be sceptical that international drug trafficking is a primary activity of the street gangs themselves, or that street gangs are important in facilitating international drug flows.

The territoriality of street gangs is often cited as one of their defining characteristics. Not only does protecting gang territory require time and attention, but also the territories controlled tend to be located in slum areas, far from the transportation corridors relevant to drug trafficking. In the El Salvador gang survey, most of the respondents were raised in poor communities and dropped out of school before turning 16; many were runaways. This lack of basic education and resources makes it unlikely that they could compete in international drug markets with sophisticated drug trafficking cartels. Moreover, when asked about the nature of the groups trafficking drugs in their countries, law enforcement agencies from the Northern Triangle countries do not mention street gangs.

Source: Max G. Manwaring, Street Gangs: The New Urban Insurgency, (Carlisle, Pennsylvania, Strategic Studies Institute, United States Army War College, March 2005) ; John P. Sullivan, "Transnational gangs: the impact of third generation gangs in Central America", Air and Space Power Journal, Second Trimester (2008). The definition used by the United States Department of Justice, available at www.justice.gov/criminal-ocgs/about-violent-gangs

documented involvement of street gang members who are children in the retailing of drugs.

Street gangs such as the Crips and the Bloods were notorious for their role in selling "crack" cocaine in parts of the United States from the late-1980s to the mid-1990s. One study of more than 1,500 arrests for the sale of cocaine made between 1989 and 1991 in two Los Angeles suburbs found that 27 per cent involved gang members.[268] The 1996 United States National Youth Gang survey estimated that 43 per cent of all street drug sales nationally involved gang members.[269] Both "crack" cocaine use and Los Angeles gang membership have declined dramatically since that time.[270]

Today, the most notorious street gangs are found in Latin America, particularly the *maras* of the Northern Triangle of Central America. Children account for a relatively high proportion of those arrested for serious drug offences in Honduras and El Salvador (6 per cent and 7 per cent, respectively).[271] Over 70 per cent of respondents to a survey of more than 1,000 gang members in El Salvador said they earned less than $250 a month. Their primary source of income appeared to be extortion,[272] so the role they play in the drug economy appears to be peripheral.[273]

C. DRUGS AND OLDER PEOPLE

The use of drugs among older people has long been an under-researched area, the importance of which has only recently become recognized. Changes in global demographics point to an increase in both the number and proportion of older people in all regions. In this section, some of the concerns related to the use of drugs among older people are briefly

gov/Survey-Analysis/Demographics#anchorage. Research on street gangs in Trinidad and Tobago found that 87 per cent of members were adults. See Charles Katz and David Choate, "Diagnosing Trinidad and Tobago's gang problem", conference paper presented at the annual meeting of the American Society of Criminology, Los Angeles, California, 2010. A recent survey of gang members in El Salvador found an average age of 25 years. See José Miguel Cruz and others, *The New Face of Street Gangs: The Gang Phenomenon in El Salvador* (2017).

268 Cheryl L. Maxson, "Street gangs and drug sales in two suburban cities", National Institute of Justice Research in Brief Series (Washington D.C., July 1995).

269 Office of Juvenile Justice and Delinquency Prevention, *1996 National Youth Gang Survey* (Washington D.C., July 1999).

270 According to online data from the Los Angeles Police Department, the number of street gang members in the city declined from over 64,000 in 1997 to 39,000 in 2005. The number of "hardcore" cocaine users in the United States declined from an estimated 1.1 million in 1988 to 445,000 in 2000 (William Rhodes and others, *What America's Users Spend on Illegal Drugs, 1988–1998* (Washington, D.C., Office of National Drug Control Policy, 2000).

271 UNODC, responses to the annual report questionnaire.

272 International Crisis Group, "Mafia of the poor: gang violence and extortion in Central America", Latin America Report No. 62 of 6 April 2017 (Brussels, 2017).

273 Cruz and others, *The New Face of Street Gangs.*

explored, together with examples that illustrate the particular issues and health consequences of drug use among this group.

Changes in the extent of drug use among older people

There is evidence in some countries that the use of drugs among older people, although starting from a low prevalence, has been increasing over the last decade and at a faster rate than among younger age groups.

In the United States, for example, data on the past-year use of any drug shows that, between 1996 and 2016 there was hardly any change in the prevalence rate among those aged 12–17, but drug use among those aged 50 and above[274] rose from 1.3 per cent to 9.8 per cent during that period, equivalent to a more than sevenfold increase.[275] In terms of the number of older drug users, the increase is even more striking because of the growth in the population of those aged 50 and above. The total number of people in the United States who used drugs in the past year at 50 and older rose from some 900,000 people in 1996 to 10.8 million people in 2016, equivalent to a 12-fold increase.

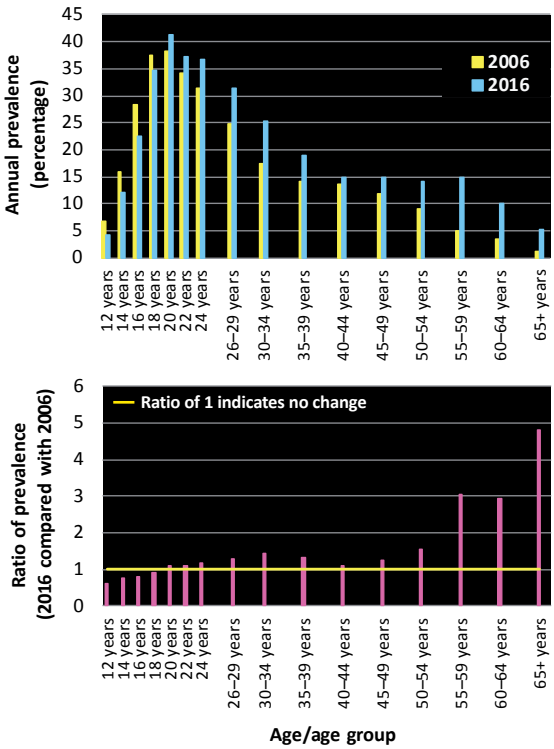
The increase was particularly large during the period 2006–2016, when the total number of annual drug users aged 50 and older tripled, from 3.6 to 10.8 million, and the annual prevalence rate of drug use of those aged 50 and older more than doubled, from 4.1 to 9.8 per cent. For those aged 60 and above, growth in prevalence rates was even more pronounced, with an almost fourfold increase in the last decade, while the total number of annual drug users among those aged 60–64 quadrupled and increased more than sixfold among those aged 65 and older.

In Germany, past-year use of any drug increased more among those aged 40 and above than the younger age groups in the period 2006–2015. Drug use among those aged 18–24 showed a more modest increase (22 per cent) over the same period.

274 Age 50 and above was the oldest age group category in the 1996 national household survey of the United States.

275 United States, Center for Behavioral Health Statistics and Quality, *2016 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, Substance Abuse and Mental Health Services Administration, 2017 and previous years).

FIG. 12 Annual prevalence of drug use and changes in the United States of America, by age, 2006 and 2016



Source: United States, Center for Behavioral Health Statistics and Quality, *2016 National Survey on Drug Use and Health: Detailed Tables* (Rockville, Maryland, Substance Abuse and Mental Health Services Administration, 2016 and previous years).

Who constitutes "older" in the context of drug use?

There is no consistently adopted lower age cut-off to categorize who is considered an "older" drug user. The cut-off age varies quite extensively across studies, starting from as low as 35.[a] More generally, however, studies in European countries have used 40 as the lower cut-off, although some studies from the United States of America have used 50.[b]

Given this lack of an internationally accepted definition of "older drug users", the present section contains information on the older age groups as available and provides, as far as possible, comprehensive age breakdowns of the available statistics.

a April Shaw, *Senior Drug Dependents and Care Structures: Scotland and Glasgow Report* (Glasgow, Scottish Drugs Forum, March 2009).

b EMCDDA, *Selected Issue 2010: Treatment and Care for Older Drug Users* (Luxembourg, 2010).

Studies among older drug users are limited

Drug use among older people is an under-researched area, the importance of which has only recently been recognized.[a, b] It should be noted that most studies among older drug users were conducted in developed countries, in particular the United States of America and in countries in Europe, and therefore the conclusions drawn from the literature may not be generalizable to the rest of the world.

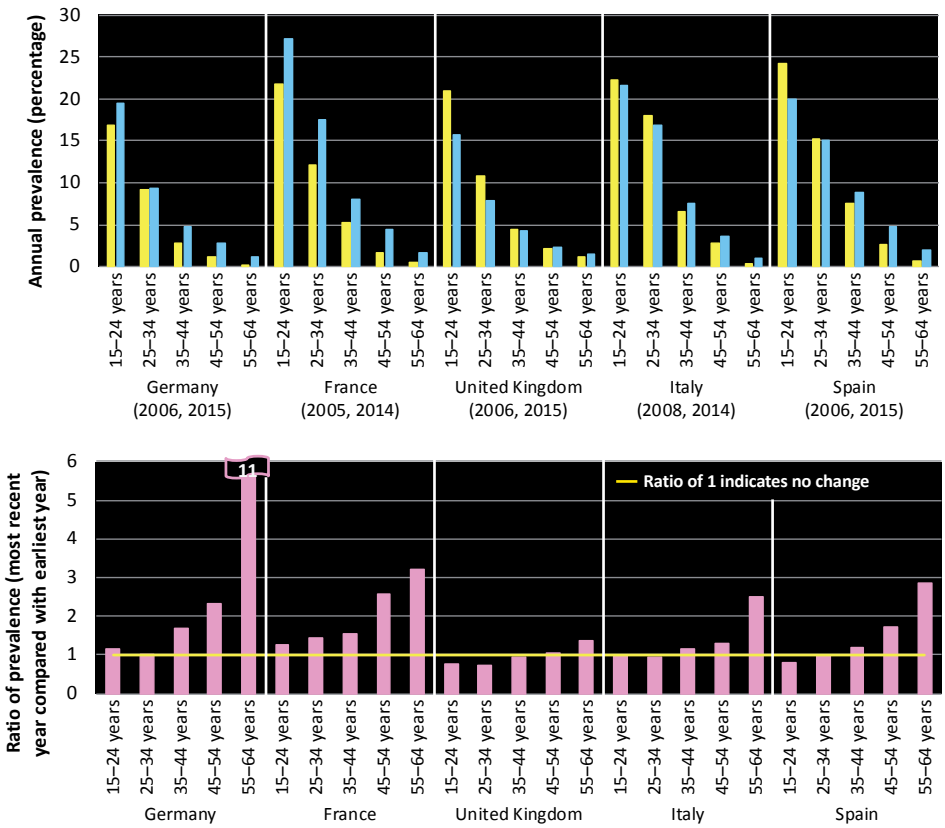
[a] Matthew H. Taylor and George T. Grossberg, "The growing problem of illicit substance abuse in the elderly: a review", *Primary Care Companion for CNS Disorders*, vol. 14, No. 4 (2012).

[b] Anne Marie Carew and Catherine Comiskey, "Treatment for opioid use and outcomes in older adults: a systematic literature review", Drug and Alcohol Dependence, vol. 182 (2018), pp. 48-57.

The use of cannabis has also been on the rise among those aged 55–64 in some of the most populated countries in Western Europe. Annual prevalence data from France, Germany, Italy, Spain and the United Kingdom show that cannabis use among those in that age group has been increasing at a higher rate than any other age group. The increase in past-year cannabis use among those aged 15–24 and 25–34 in those countries has been much less pronounced and, in some cases, the prevalence has declined.

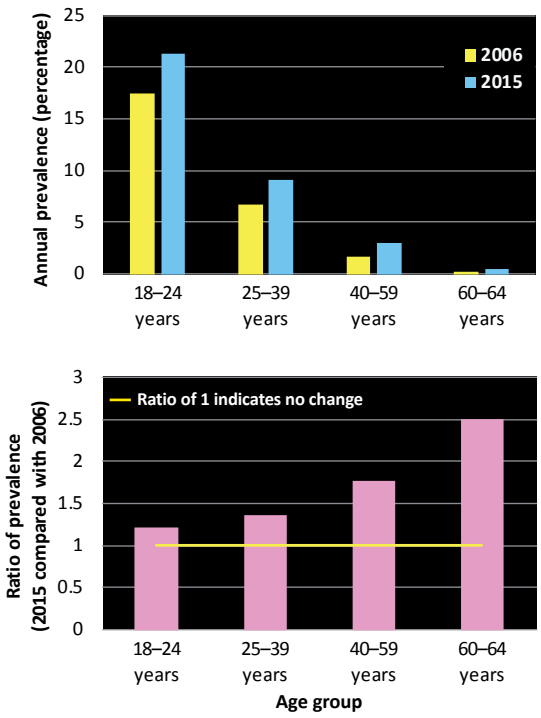
In Australia, there was a small decline in the annual prevalence rate of drug use for those aged 14–19 years during the period 2007–2016, but with prevalence rates increasing by 60 to 70 per cent in the 50–59 and 60 and older age groups.

FIG. 13 | Annual prevalence of cannabis use and changes in selected countries in Western Europe, by age group, selected years



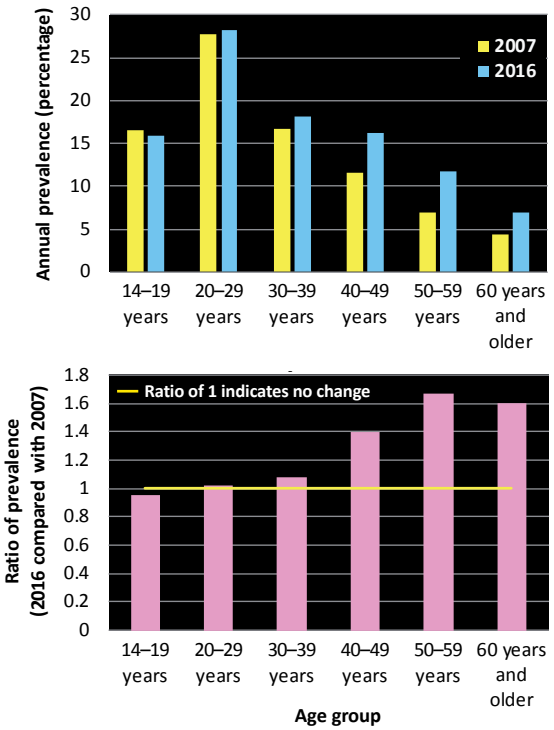
Source: EMCDDA, Statistical Bulletin 2017.

FIG. 14 Annual prevalence of drug use and changes in Germany, by age group, 2006–2015



Source: D. Piontek, E. Gomes de Matos, J. Atzendorf, and L. Kraus, *Kurzbericht Epidemiologischer Suchtsurvey: Trends der Prävalenz des Konsums illegaler Drogen und des klinisch relevanten Cannabisgebrauchs nach Geschlecht und Alter 1990-2015* (Munich, IFT Institut für Therapieforschung, 2016).

FIG. 15 Annual prevalence of drug use and changes in Australia, by age group, 2007–2016



Source: Australian Institute of Health and Welfare, *National Drug Strategy Household Survey 2016: Detailed Findings*, Drug Statistics Series No. 31 (Canberra, September 2017).

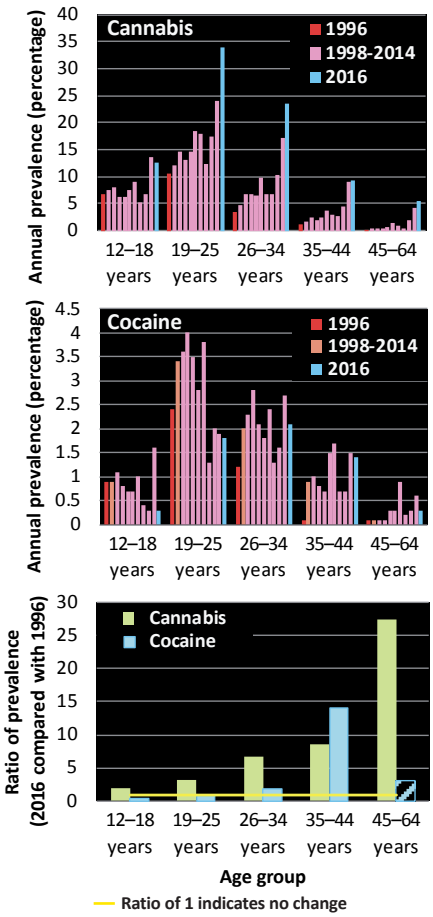
In Chile, the past-year use of cannabis among those aged 45–64 showed a fourfold increase over the decade to 2016, and an almost 30-fold increase between 1996 and 2016. The rise in the annual prevalence of cannabis use was less pronounced among younger age groups. A similar pattern was also revealed for the use of cocaine: the annual prevalence of use declined for those aged 12–18 and 19–25 during the period 1996–2016, but increased 14-fold among those aged 35–44.

What factors might lie behind the increase in the extent of drug use?

There are a number of factors that could explain the increased prevalence of drug use observed among older people in some countries. Changing perceptions of the risks associated with drug use, the increased availability of drugs, changes in social acceptance of drug use and self-medication to deal with pain or anxiety or challenges associated with retirement might all contribute to the initiation or resumption of drug use in older people. Another factor could be a cohort effect, whereby groups of people share common social and cultural experiences because of when they were born. These experiences might be different from those of previous cohorts. The increase in drug use seen among the older population could be a consequence of the ageing of a cohort of users who have a higher prevalence of substance use compared with previous cohorts.

There is evidence that, in western countries, the baby-boom generation (born between 1946 and 1964), used drugs when they were young more than the previous generation. Many of them have continued to use drugs into old age, and this is reflected in the increasing prevalence of drug use seen among

FIG. 16 Changes in annual prevalence of drug use in Chile, by age group, 1996–2016



Source: National Drug and Alcohol Prevention and Rehabilitation Service (SENDA), *Décimo Segundo Estudio Nacional de Drogas en Población General de Chile, 2016* (Chilean Drug Observatory, December 2017)

Note: The annual prevalence of cocaine use is reported at less than 0.1 per cent for 1996 among those aged 45–64 years. In calculating the ratio, a prevalence of 0.1 per cent was used. Given the uncertainty around this assumption and the possibility that the ratio might be much higher, a cross-hatched bar is shown for the increase of cocaine use among those aged 45–64 years over the period 1996–2016.

older age groups in many developed countries as this cohort ages. [276, 277, 278, 279]

For instance, the United States has witnessed significant increases in the past-year use of cannabis among those aged 50 and older. This trend is capturing, in part, the ageing baby boomers, who reported higher rates of substance use compared with the previous generation. [280, 281] Among those aged 50–59, past-year use of cannabis increased from 3.1 per cent to 5.7 per cent from 2002 to 2007, and the rate of past-year non-medical use of prescription drugs increased from 2.2 per cent to 4.4 per cent. Typical characteristics associated with continued drug use in this age group included male gender, unmarried status, early onset of drug use, lower levels of education, low income, unemployment as a result of disability, recent alcohol or tobacco use and having a major depressive episode in the previous year. In addition to the cohort effect of continued cannabis use by baby boomers, a change in the perceptions around cannabis may also have contributed to an increase in use. Over the past decade, decreasing risk perceptions of harm and an ongoing debate around legalization of the drug might have influenced the use of cannabis. [282, 283, 284]

Among countries in Europe with a higher prevalence of cannabis use among older people, similar age cohort effects have been identified to explain increasing trends in the use of cannabis. Analyses of historical data suggest that the main cause of the phenomenon is an ageing cohort containing a

276 Caryl M. Beynon, "Drug use and ageing: older people do take drugs!", *Age and Ageing*, vol. 38, No. 1 (2009), pp. 8–10.

277 Roger Nicholas and others, *Preventing and Reducing Alcohol- and Other Drug-Related Harm among Older People: A Practical Guide for Health and Welfare Professionals* (Adelaide, South Australia, National Centre for Education and Training on Addiction, Flinders University, 2015).

278 Beth Han, Joseph Gfroerer and James Colliver, "An examination of trends in illicit drug use among adults aged 50 to 59 in the United States", OAS Data Review (Rockville, Maryland, Office of Applied Studies, Substance Abuse and Mental Health Services Administration (SAMHSA), August 2009).

279 Frederic C. Blow and Kristen L. Barry, "Alcohol and substance misuse in older adults", *Current Psychiatry Reports*, vol. 14, No. 4 (2012), pp. 310–319.

280 Li-Tzy Wu and Dan G. Blazer, "Illicit and nonmedical drug use among older adults: a review", *Journal of Ageing and Health*, vol. 23, No. 3 (2011), pp. 481–504.

281 Benjamin H. Han and others, "Demographic trends among older cannabis users in the United States, 2006–13", *Addiction*, vol. 112, No. 3 (2010), pp. 516–525.

282 Han, Gfroerer and Colliver, "An examination of trends in illicit drug use among adults aged 50 to 59 in the United States".

283 William C. Kerr, Camillia Lui and Yu Ye, "Trends and age, period and cohort effects for marijuana use prevalence in the 1984–2015 US National Alcohol Surveys", *Addiction*, vol. 113, No. 3 (2017), pp. 473–481.

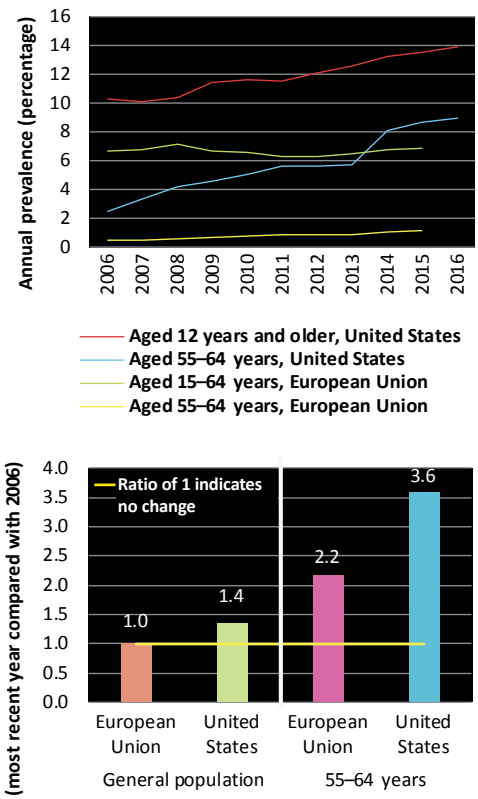
284 *World Drug Report 2017* (United Nations publication, Sales No. E.16.XI.6).

sizeable proportion of individuals who continue using drugs, almost exclusively cannabis, into an advanced age.[285]

Higher levels of drug use among older people might also be explained by late initiation and changed environmental conditions. However, adolescence (12–17 years of age) is generally regarded as the critical risk period for the initiation of substance use.[286] In the United States, a study of drug users aged 50–59 covering the period 2002–2007 found that very few had started to use drugs at an older age. Approximately 90 per cent had initiated drug use by the age of 30 and about 72 per cent had initiated non-medical use of prescription drugs by that age. Only 3 per cent had initiated drug use and 9 per cent had initiated non-medical use of prescription drugs at age 50 or older.[287] Reasons for initiating drug use later in life included self-medicating painful medical conditions. Older people experience higher rates of mental health conditions such as depression and higher rates of social risk factors for drug use such as bereavement, social isolation, financial problems and poor social support.[288]

A major life-changing event that occurs among older people is retirement. Evidence on the impact of retirement on drug use is very limited. However, a study of 978 people in the United States looked at various forms of retirement and the impact it has on drug use. Being fully retired (that is, being completely disengaged from the workforce) was found to be associated with increased use of drugs compared with those who deferred retirement and remained within the workforce. However, this depended on the age of full retirement, with younger retirees reporting more problems related to drug use than older retirees. This relationship was reversed for those who deferred retirement and remained employed at their primary workplaces. That is, younger, retirement-eligible workers who deferred retirement and continued to work reported fewer drug-related problems than their older peers.[289]

FIG. 17 Annual prevalence of cannabis use and changes in the United States of America and the European Union among the general population and those aged 55–64 years, 2006–2016



Source: United States, Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, *2016 National Survey on Drug Use and Health*, and previous years; and EMCDDA, Statistical Bulletin 2017.

Note: Prevalence rates for the European Union are population-weighted means of the national estimates. For years where a prevalence rate is not available for a country, these are either linearly interpolated between the years where national rates are available or, if this is not possible, given the same rate as the nearest year.

285 EMCDDA, *Selected Issue 2010: Treatment and Care for Older Drug Users* (Luxembourg, Publications Office of the European Union, 2010).

286 Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. "Age of substance use initiation among treatment admissions aged 18 to 30".

287 Han, Gfroerer and Colliver, "An examination of trends in illicit drug use among adults aged 50 to 59 in the United States".

288 Matthew H. Taylor and George T. Grossberg, "The growing problem of illicit substance abuse in the elderly: a review", *Primary Care Companion for CNS Disorders*, vol. 14, No. 4 (2012).

289 Samuel Bacharach and others, "Retirement and drug abuse: the conditioning role of age and retirement trajectory", *Addictive Behaviors*, vol. 33, No. 12 (2008), pp. 1610–1614.

Drug treatment among older people who use drugs

Ageing drug users face multiple health issues

The physical ageing process can be accelerated by the cumulative effects of drug use, including experience of prior drug overdoses and increased risk of acquiring infectious diseases such as hepatitis C and HIV through unsafe injecting practices. Older drug users face health conditions that normally occur with increasing frequency with older age, such as degenerative disorders, circulatory and respiratory problems and diabetes, but at higher rates than among their non-drug using peers. Older drug users also experience mental health issues at higher levels than their peers or younger drug users.[290, 291, 292, 293, 294]

Challenges for drug treatment and care

The development of drug use disorders and dependence results from a complex interaction between repeated exposure to drugs on the one hand, and biological, psychosocial and social factors on the other. Effective treatment for such a complex, chronic condition as drug dependence requires continuing care and interaction across many disciplines, such as pharmacological, behavioural therapy and social support.[295] Numerous challenges exist in providing treatment interventions and care for substance use that are specific to, or more pronounced for, older drug users.

Owing to the possible simultaneous presence of a range of conditions, the complicated physical health needs of older drug users make drug dependence treatment more complex.[296, 297] Historically, little attention has been paid to substance use disorders among older people, with insufficient research into and evidence on interventions for their treatment, and with limited discussion on appropriate treatment services.[298, 299, 300, 301]

In combination with medical and psychiatric problems, older drug users commonly live with the negative social consequences of long-term drug use. These are important considerations in the provision of effective treatment. Older drug users are more likely to be socially and economically disadvantaged and marginalized, with a greater chance of having experienced homelessness or periods of incarceration. Social exclusion and isolation from family and friends and a lack of social support are experienced more often and more acutely by older drug users than their peers or younger drug users. The absence of social support is an important predictor of relapse.[302, 303, 304]

Drug-related treatment increases among older people who use drugs in the United States

Some of the most comprehensive and detailed treatment data available come from the United States. According to the latest data available from that

290 EMCDDA, *Health and Social Responses to Drug Problems: a European Guide* (Luxembourg, Publications Office of the European Union, 2017).

291 *Selected Issue 2010*.

292 Caryl M. Beynon and others, "Self reported health status, and health service contact, of illicit drug users aged 50 and over: a qualitative interview study in Merseyside, United Kingdom", *BMC Geriatrics*, vol. 9, No. 45 (2009).

293 Lisa Johnston and others, "Responding to the needs of ageing drug users" (EMCDDA, 2017).

294 Caryl M. Beynon, "Drug use and ageing".

295 UNODC and WHO, "Principles of drug dependence treatment" discussion paper, March 2008.

296 Ilana Crome and others, *Our Invisible Addicts: First Report of the Older Persons' Substance Misuse Working Group of the Royal College of Psychiatrists*, (London, Royal College of Psychiatrists, 2011).

297 Nick Doukas, "Older adults in methadone maintenance treatment: a literature review", *Journal of Social Work Practice in the Addictions*, vol. 11, No. 3 (2011), pp. 230–244.

298 Anne Marie Carew and Catherine Comiskey, "Treatment for opioid use and outcomes in older adults: a systematic literature review", *Drug and Alcohol Dependence*, vol.182, (2018), pp. 48–57.

299 Alexis Kuerbis and Paul Sacco, "A review of existing treatments for substance abuse among the elderly and recommendations for future directions, *Substance Abuse: Research and Treatment,* vol. 7 (2013), pp. 13–37.

300 Wu and Blazer, "Illicit and nonmedical drug use among older adults: a review".

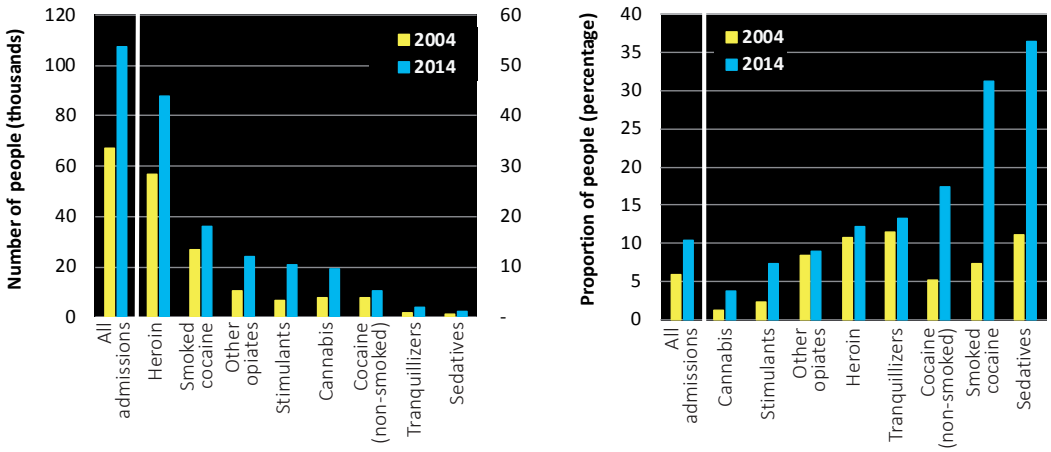
301 Orion Mowbray and Adam Quinn, "A scoping review of treatments for older adults with substance use problems", *Research on Social Work Practice*, vol. 26, No. 1 (2016),pp. 74–87.

302 Michelle R. Lofwall and others, "Characteristics of older opioid maintenance patients", *Journal of Substance Abuse Treatment*, vol. 28, No. 3 (2005), pp. 265–272.

303 *Selected Issue 2010*.

304 Yih-Ing Hser, "Predicting long-term stable recovery from heroin addiction: findings from a 33-year follow-up study", *Journal of Addictive Diseases*, vol. 26, No. 1 (2007), pp. 51–60.

FIG. 18 Trends in the number and proportion of those aged 50 and older in admissions to treatment related to drug use, United States, 2004–2014



Source: United States, Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Office of Applied Studies, *Treatment Episode Data Set (TEDS): 1994–2004 – National Admissions to Substance Abuse Treatment Services*, DASIS Series: S-33, DHHS Publication No. (SMA) 06-4180 (Rockville, Maryland, 2006); and United States, Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Treatment Episode Data Set (TEDS): 2004–2014 – National Admissions to Substance Abuse Treatment Services*, BHSIS Series S-84, HHS Publication No. (SMA) 16-4986 (Rockville, Maryland, 2016).

Note: In the left chart showing the number of admissions to treatment, "All admissions" are plotted on the left axis, while admissions by specific drug types are plotted on the right axis.

country, the number of admissions to drug use treatment services for those aged 50 and older increased by 59 per cent over the period 2004–2014. This age group is increasingly prominent in treatment admissions, with the proportion of those 50 and older in all treatment admissions nearly doubling to 10.4 per cent during that period.[305, 306]

The increasing number and prominence of those aged 50 and older who were admitted to treatment services during that period was observed for all drug types. For cocaine in particular, the proportion of all those admitted who were aged 50 and older increased substantially. Although the number of admissions to treatment for the use of sedatives was relatively low, in 2014 those aged 50 and older accounted for more than one third of the total, up from roughly 1 in 10 a decade earlier. The proportion of treatment admissions for those aged 50 and older who were referred through the court or criminal justice system declined slightly over the period 1992–2012, from 29 per cent to 25 per cent.[307]

Treatment for the use of opioids in Europe – an ageing cohort of people who use heroin

In Europe, opioid users, particularly those who inject, currently represent a substantial proportion of the drug treatment population and have traditionally represented the largest group requiring specialized drug treatment. Although the number of opioid users entering treatment is declining, the proportion of clients aged over 40 entering treatment for opioid use increased from 1 in 5 in 2006 to 1 in 3 in 2013. The evidence points to a large

305 United States, Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Office of Applied Studies, *Treatment Episode Data Set (TEDS): 1994–2004–National Admissions to Substance Abuse Treatment Services*, DASIS Series S-33, DHHS Publication No. SMA 06-4180, (Rockville, Maryland, 2006).

306 United States, Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Treatment Episode Data Set (TEDS): 2004–2014–National Admissions to Substance Abuse Treatment Services*, BHSIS Series S-84, HHS Publication No. SMA 16-4986 (Rockville, Maryland, 2016).

307 United States, Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, *Treatment Episode Data Set: Admissions (TEDS-A) Concatenated, 1992 to 2012*, ICPSR 25221 (Ann Arbor, Michigan, Inter-university Consortium for Political and Social Research, 2015).

ageing cohort of opioid users who started injecting heroin during the heroin "epidemics" of the 1980s and 1990s and who have shaped and characterized current European specialist and low-threshold treatment systems.[308]

Current lack of response to a growing problem

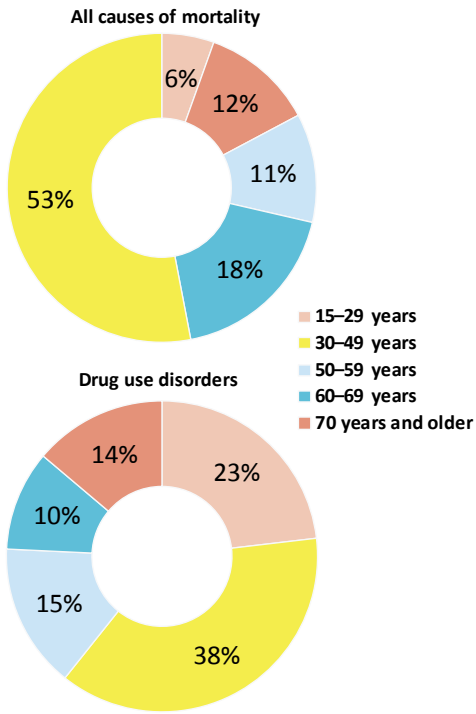
Particular and wide-ranging health issues arise from drug use by older users, in particular for those with a history of drug use disorders and dependence. Treatment for substance use is more complicated because of these concurrent mental and physical health disorders. The lack of evidence on what treatment works best for older drug users also exacerbates the situation. This is a relatively recent phenomenon and there is some concern that the infrastructure is not in place to deal with the growing numbers of older drug users and their health needs over the coming decades.

In general, the development of specific interventions or services for older drug users has yet to be considered a priority, possibly due to the lower prevalence of drug use among older people than the younger population. For example, there were no explicit references to older users in the drug strategies of European countries in 2010, and the situation has changed little since. Specialized treatment and care programmes for older drug users are rare in Europe, with most initiatives directed towards younger people.[309, 310]

Drug-related deaths among older people who use drugs

Dying as a result of the use of drugs is clearly the most extreme outcome. Although those who die from drug use disorders (deaths that are directly caused by the use of drugs) are mostly younger people, those aged 50 and older still constitute a sizeable proportion. Among deaths from all causes of mortality globally in 2015, the largest proportion (53 per cent) occurred among those aged 70 and above. Deaths resulting from drug use disorders occur at a relatively young age, with almost one quarter (23 per cent) among those aged 15–29 years and a large proportion (38 per cent) occurring among those in the 30–49 age group. However, a considerable proportion of deaths worldwide from drug use disorders (39 per cent) do occur among drug users aged 50 and older.

FIG. 19 Deaths resulting from drug use disorders and from all causes of mortality, by age group, worldwide, 2015



Source: WHO, Global Health Estimates 2015: Deaths by Cause, Age, Sex, by Country and by Region, 2000–2015 (Geneva, 2016).

It should be noted that for those aged 50 and older, deaths resulting from drug use disorders represent a smaller proportion of total deaths from all causes of mortality; deaths resulting from drug use disorders account for a higher proportion of mortality among younger people. As people get older, there is a greater number of age-related causes of mortality.

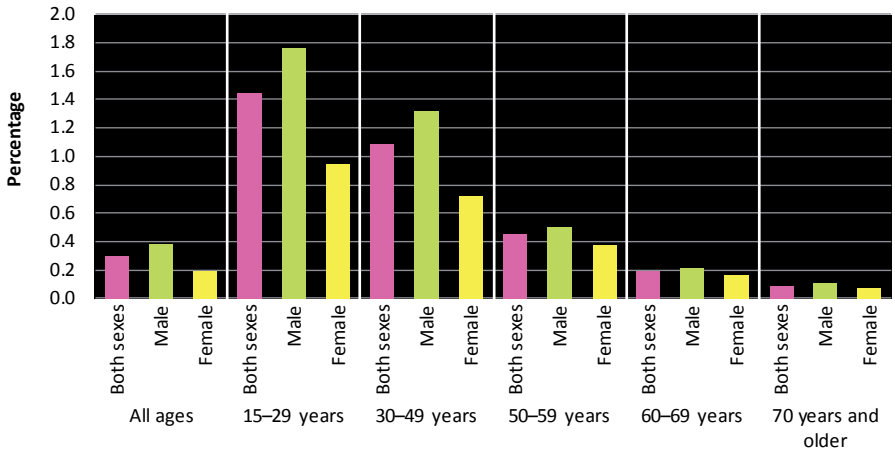
However, during the period 2000–2015, there was a rapid increase globally in the number of deaths resulting from drug use disorders among those aged 50 and older. This increase was more pronounced than among drug users under the age of 50. For those under the age of 50, deaths resulting from

308 Alessandro Pirona and others, "Ageing and addiction: challenges for treatment systems" EMCDDA Poster Series (Lisbon, September 2015).

309 *Selected Issue 2010*.

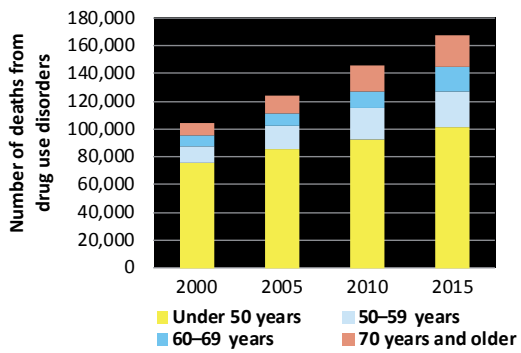
310 Johnston and others, "Responding to the needs of ageing drug users".

FIG. 20 Proportion of deaths resulting from drug use disorders among deaths from all causes, by age group, worldwide, 2015



Source: WHO, Global Health Estimates 2015: Deaths by Cause, Age, Sex, by Country and by Region, 2000–2015 (Geneva, 2016).

FIG. 21 Deaths resulting from drug use disorders, by age group, worldwide, 2000–2015



Source: WHO, Global Health Estimates 2015: Deaths by Cause, Age, Sex, by Country and by Region, 2000–2015 (Geneva, 2016).

drug use disorders increased by one third, but for those aged 50 and older, the number more than doubled. Those 50 and older also accounted for an increasing proportion of deaths resulting from drug use disorders: while in 2000, 27 per cent of all deaths from drug use disorders were among people aged 50 and older, by 2015 that proportion had risen to 39 per cent.

The increasing number of deaths resulting from drug use disorders among those aged 50 and older, and the increasing proportion of all such deaths represented by that age group, is consistent across all regions. In particular, in the Western Pacific[311] and in the Americas, deaths resulting from drug use disorders among those aged 50 and older rose more than threefold over the period 2000–2015.

In Europe, the number of overdose deaths increased between 2006 and 2013 for those aged 40 and older, but declined for those under 40, in part a manifestation of the ageing population of opioid users.[312] In the United Kingdom, which accounts for almost one third of overdose deaths reported in Europe,[313] there has been a sharp rise in the total number of deaths involving heroin and/or morphine since 2012. An ageing cohort of heroin users, increased purity and availability of the drug and changes in the specific drugs taken alongside heroin and/or morphine have contributed to this rise.[314]

Globally, three quarters of deaths resulting from drug use disorders among those 50 and older are associated with the use of opioids. Deaths associated

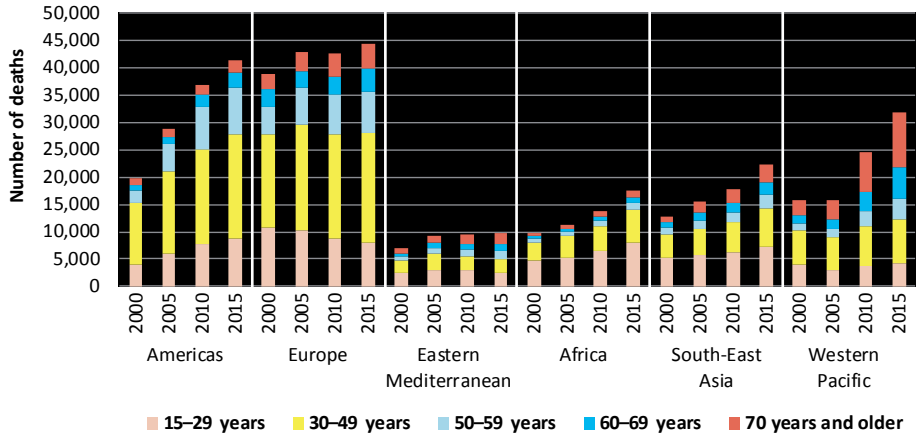
311 In the WHO classification, the Western Pacific region includes Cambodia, China, Japan, Malaysia, Mongolia, the Philippines, the Republic of Korea and Viet Nam, as well as Australia and New Zealand and the Pacific island countries.

312 Pirona and others, "Ageing and addiction".

313 EMCDDA, European Drug Report 2017: Trends and Developments (Luxembourg, Publications Office of the European Union, 2017).

314 United Kingdom, Office for National Statistics, "Deaths related to drug poisoning in England and Wales, 2015 registrations", Statistical Bulletin (September 2016).

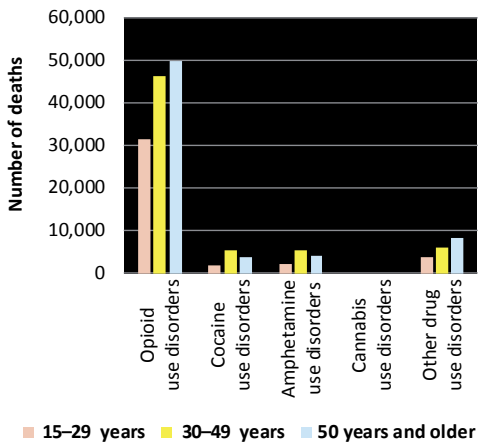
FIG. 22 | Deaths resulting from drug use disorders, by age group and region, 2000–2015



Source: WHO, Global Health Estimates 2015: Deaths by Cause, Age, Sex, by Country and by Region, 2000–2015 (Geneva, 2016).
Note: Regions correspond to the classifications used by WHO.

with cocaine use disorders and amphetamine use disorders each account for about 6 per cent, and those associated with the use of other drugs make up the remaining 13 per cent.[315] This distribution is a reflection of a number of factors: the ability to identify different substances as the underlying cause of death, different historical patterns of drug use and the size of the populations using different drugs, and the availability and effectiveness of treatment options that may extend the life of drug users.

FIG. 23 | Deaths resulting from drug use disorders, by main drug categories and age, worldwide, 2015



Source: WHO, Global Health Estimates 2015: Deaths by Cause, Age, Sex, by Country and by Region, 2000–2015 (Geneva, 2016).

315 WHO, Global Health Estimates 2015: Deaths by Cause, Age, Sex, by Country and by Region, 2000–2015 (Geneva, 2016).

GLOSSARY

amphetamine-type stimulants — a group of substances composed of synthetic stimulants controlled under the Convention on Psychotropic Substances of 1971 and from the group of substances called amphetamines, which includes amphetamine, methamphetamine, methcathinone and the "ecstasy"-group substances (3,4-methylenedioxymethamphetamine (MDMA) and its analogues).

amphetamines — a group of amphetamine-type stimulants that includes amphetamine and methamphetamine.

annual prevalence — the total number of people of a given age range who have used a given drug at least once in the past year, divided by the number of people of the given age range, and expressed as a percentage.

coca paste (or coca base) — an extract of the leaves of the coca bush. Purification of coca paste yields cocaine (base and hydrochloride).

"crack" cocaine — cocaine base obtained from cocaine hydrochloride through conversion processes to make it suitable for smoking.

cocaine salt — cocaine hydrochloride.

drug use — use of controlled psychoactive substances for non-medical and non-scientific purposes, unless otherwise specified.

new psychoactive substances — substances of abuse, either in a pure form or a preparation, that are not controlled under the Single Convention on Narcotic Drugs of 1961 or the 1971 Convention, but that may pose a public health threat. In this context, the term "new" does not necessarily refer to new inventions but to substances that have recently become available.

opiates — a subset of opioids comprising the various products derived from the opium poppy plant, including opium, morphine and heroin.

opioids — a generic term applied to alkaloids from opium poppy (opiates), their synthetic analogues (mainly prescription or pharmaceutical opioids) and compounds synthesized in the body.

problem drug users — people who engage in the high-risk consumption of drugs; for example, people who inject drugs, people who use drugs on a daily basis and/or people diagnosed with drug use disorders (harmful use or drug dependence), based on clinical criteria as contained in the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association, or the International Classification of Diseases and Related Health Problems (tenth revision) of the World Health Organization.

people who suffer from drug use disorders/people with drug use disorders — a subset of people who use drugs. People with drug use disorders need treatment, health and social care and rehabilitation. Harmful use of substances and dependence are features of drug use disorders.

harmful use of substances — defined in the International Statistical Classification of Diseases and Related Health Problems (tenth revision) as a pattern of use that causes damage to physical or mental health.

dependence — defined in the International Statistical Classification of Diseases and Related Health Problems (tenth revision) as a cluster of physiological, behavioural and cognitive phenomena in which the use of a substance or a class of substances takes on a much higher priority for a given individual than other behaviours that once had greater value. A central descriptive characteristic of dependence syndrome is the desire (often strong, sometimes overpowering) to take psychoactive drugs.

substance or drug use disorders — the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association also refers to "drug or substance use disorder" as patterns of symptoms resulting from the use of a substance despite experiencing problems as a result of using substances. Depending on the number of symptoms identified, substance use disorder may vary from moderate to severe.

prevention of drug use and treatment of drug use disorders — the aim of "prevention of drug use" is to prevent or delay the initiation of drug use, as well as the transition to drug use disorders. Once a person develops a drug use disorder, treatment, care and rehabilitation are needed.

REGIONAL GROUPINGS

The World Drug Report uses a number of regional and subregional designations. These are not official designations, and are defined as follows:

- East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, Uganda and United Republic of Tanzania
- North Africa: Algeria, Egypt, Libya, Morocco, South Sudan, Sudan and Tunisia
- Southern Africa: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe
- West and Central Africa: Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone and Togo
- Caribbean: Antigua and Barbuda, Bahamas, Barbados, Bermuda, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines and Trinidad and Tobago
- Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama
- North America: Canada, Mexico and United States of America
- South America: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela (Bolivarian Republic of)
- Central Asia and Transcaucasia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- East and South-East Asia: Brunei Darussalam, Cambodia, China, Democratic People's Republic of Korea, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Singapore, Thailand, Timor-Leste and Viet Nam
- South-West Asia: Afghanistan, Iran (Islamic Republic of) and Pakistan
- Near and Middle East: Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, United Arab Emirates and Yemen
- South Asia: Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka
- Eastern Europe: Belarus, Republic of Moldova, Russian Federation and Ukraine
- South-Eastern Europe: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, Romania, Serbia, the former Yugoslav Republic of Macedonia and Turkey
- Western and Central Europe: Andorra, Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom of Great Britain and Northern Ireland
- Oceania: Australia, Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu and small island territories

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UNODC Research

Following last year's 20th anniversary edition, the *World Drug Report 2018* is again presented in a special five-booklet format designed to enhance reader friendliness while maintaining the wealth of information contained within.

Booklet 1 summarizes the content of the four subsequent substantive booklets and presents policy implications drawn from their findings. Booklet 2 provides a global overview of the latest estimates of and trends in the supply, use and health consequences of drugs. Booklet 3 examines current estimates of and trends in the cultivation, production and consumption of the three plant-based drugs (cocaine, opiates and cannabis), reviews the latest developments in cannabis policies and provides an analysis of the global synthetic drugs market, including new psychoactive substances. Booklet 4 looks at the extent of drug use across age groups, particularly among young and older people, by reviewing the risks and vulnerabilities to drug use in young people, the health and social consequences they experience and their role in drug supply, as well as highlighting issues related to the health care needs of older people who use drugs. Finally, Booklet 5 focuses on the specific issues related to drug use among women, including the social and health consequences of drug use and access to treatment by women with drug use disorders; it also discusses the role played by women in the drug supply chain.

Like all previous editions, the *World Drug Report 2018* is aimed at improving the understanding of the world drug problem and contributing towards fostering greater international cooperation for countering its impact on health and security.

The statistical annex is published on the UNODC website:
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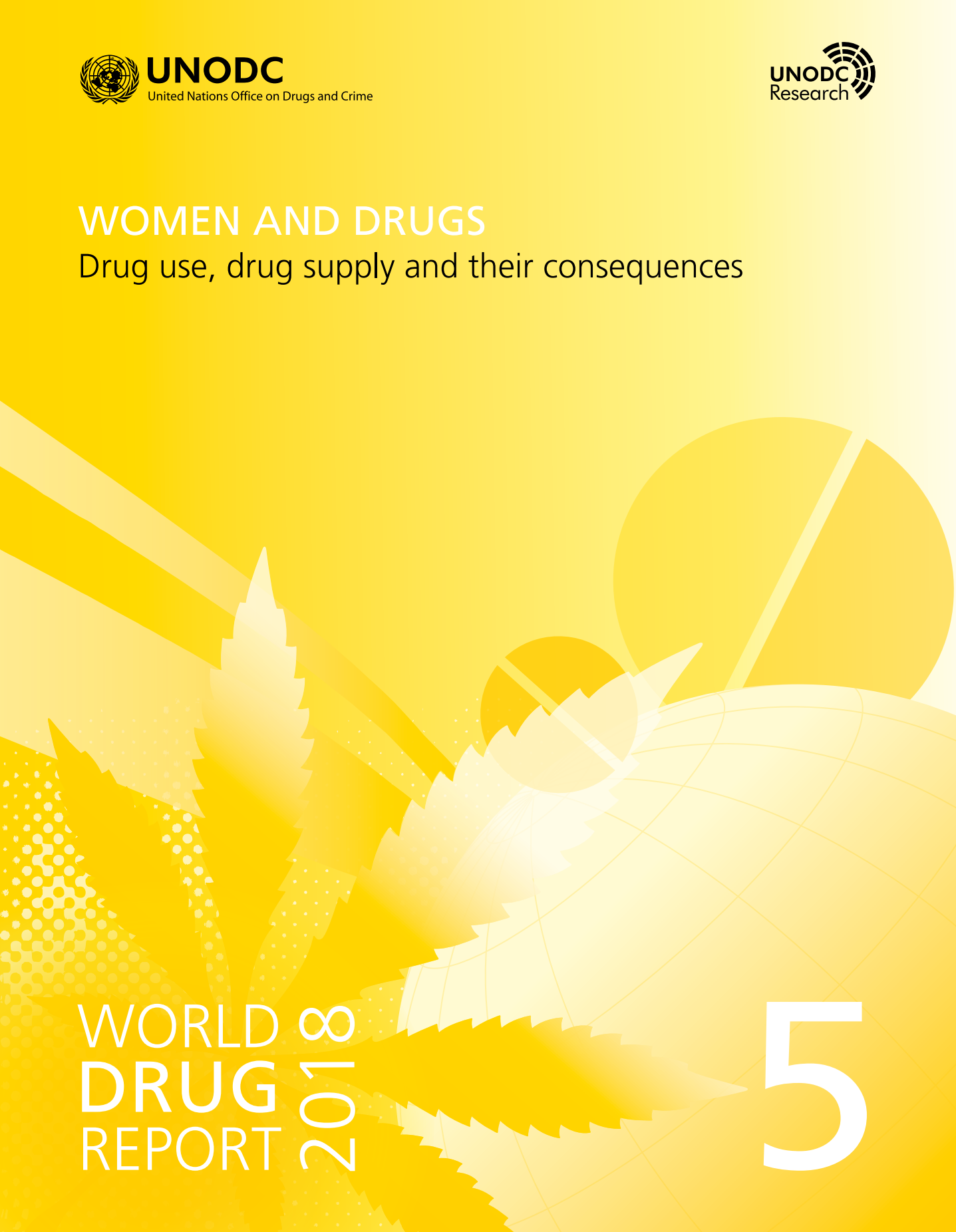
UNODC Research

WOMEN AND DRUGS

Drug use, drug supply and their consequences



WORLD DRUG REPORT 2018

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PREFACE

Both the range of drugs and drug markets are expanding and diversifying as never before. The findings of this year's *World Drug Report* make clear that the international community needs to step up its responses to cope with these challenges.

We are facing a potential supply-driven expansion of drug markets, with production of opium and manufacture of cocaine at the highest levels ever recorded. Markets for cocaine and methamphetamine are extending beyond their usual regions and, while drug trafficking online using the darknet continues to represent only a fraction of drug trafficking as a whole, it continues to grow rapidly, despite successes in shutting down popular trading platforms.

Non-medical use of prescription drugs has reached epidemic proportions in parts of the world. The opioid crisis in North America is rightly getting attention, and the international community has taken action. In March 2018, the Commission on Narcotic Drugs scheduled six analogues of fentanyl, including carfentanil, which are contributing to the deadly toll. This builds on the decision by the Commission at its sixtieth session, in 2017, to place two precursor chemicals used in the manufacture of fentanyl and an analogue under international control.

However, as this *World Drug Report* shows, the problems go far beyond the headlines. We need to raise the alarm about addiction to tramadol, rates of which are soaring in parts of Africa. Non-medical use of this opioid painkiller, which is not under international control, is also expanding in Asia. The impact on vulnerable populations is cause for serious concern, putting pressure on already strained health-care systems.

At the same time, more new psychoactive substances are being synthesized and more are available than ever, with increasing reports of associated harm and fatalities.

Drug treatment and health services continue to fall short: the number of people suffering from drug use disorders who are receiving treatment has remained low, just one in six. Some 450,000 people died in 2015 as a result of drug use. Of those deaths, 167,750 were a direct result of drug use disorders, in most cases involving opioids.

These threats to health and well-being, as well as to security, safety and sustainable development, demand an urgent response.

The outcome document of the special session of the General Assembly on the world drug problem held in 2016 contains more than 100 recommendations on promoting evidence-based prevention, care and other measures to address both supply and demand.

We need to do more to advance this consensus, increasing support to countries that need it most and improving international cooperation and law enforcement capacities to dismantle organized criminal groups and stop drug trafficking.

The United Nations Office on Drugs and Crime (UNODC) continues to work closely with its United Nations partners to assist countries in implementing the recommendations contained in the outcome document of the special session, in line with the international drug control conventions, human rights instruments and the 2030 Agenda for Sustainable Development.

In close cooperation with the World Health Organization, we are supporting the implementation of the *International Standards on Drug Use Prevention* and the international standards for the treatment of drug use disorders, as well as the guidelines on treatment and care for people with drug use disorders in contact with the criminal justice system.

The World Drug Report 2018 highlights the importance of gender- and age-sensitive drug policies, exploring the particular needs and challenges of women and young people. Moreover, it looks into

increased drug use among older people, a development requiring specific treatment and care.

UNODC is also working on the ground to promote balanced, comprehensive approaches. The Office has further enhanced its integrated support to Afghanistan and neighbouring regions to tackle record levels of opiate production and related security risks. We are supporting the Government of Colombia and the peace process with the Revolutionary Armed Forces of Colombia (FARC) through alternative development to provide licit livelihoods free from coca cultivation.

Furthermore, our Office continues to support efforts to improve the availability of controlled substances for medical and scientific purposes, while preventing misuse and diversion – a critical challenge if we want to help countries in Africa and other regions come to grips with the tramadol crisis.

Next year, the Commission on Narcotic Drugs will host a high-level ministerial segment on the 2019 target date of the 2009 Political Declaration and Plan of Action on International Cooperation towards an Integrated and Balanced Strategy to Counter the World Drug Problem. Preparations are under way. I urge the international community to take this opportunity to reinforce cooperation and agree upon effective solutions.

Yury Fedotov
Executive Director
United Nations Office on Drugs and Crime

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EXPLANATORY NOTES

The boundaries and names shown and the designations used on maps do not imply official endorsement or acceptance by the United Nations. A dotted line represents approximately the line of control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Disputed boundaries (China/India) are represented by cross-hatch owing to the difficulty of showing sufficient detail.

The designations employed and the presentation of the material in the *World Drug Report* do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities or concerning the delimitation of its frontiers or boundaries.

Countries and areas are referred to by the names that were in official use at the time the relevant data were collected.

All references to Kosovo in the *World Drug Report*, if any, should be understood to be in compliance with Security Council resolution 1244 (1999).

Since there is some scientific and legal ambiguity about the distinctions between "drug use", "drug misuse" and "drug abuse", the neutral terms "drug use" and "drug consumption" are used in the *World Drug Report*. The term "misuse" is used only to denote the non-medical use of prescription drugs.

All uses of the word "drug" in the *World Drug Report* refer to substances controlled under the international drug control conventions.

All analysis contained in the *World Drug Report* is based on the official data submitted by Member States to the United Nations Office on Drugs and Crime through the annual report questionnaire unless indicated otherwise.

The data on population used in the *World Drug Report* are taken from: *World Population Prospects: The 2017 Revision* (United Nations, Department of Economic and Social Affairs, Population Division).

References to dollars ($) are to United States dollars, unless otherwise stated.

References to tons are to metric tons, unless otherwise stated.

The following abbreviations have been used in the present booklet:

PWID people who inject drugs

UNODC United Nations Office on Drugs and Crime

WHO World Health Organization

KEY FINDINGS

Women's drug use differs greatly from that of men

Non-medical use of tranquillizers and opioids is common

The prevalence of the non-medical use of opioids and tranquillizers among women remains at a comparable level to that of men, if not actually higher. On the other hand, men are far more likely than women to use cannabis, cocaine and opiates.

While women who use drugs typically begin using substances later than men, once they have initiated substance use, women tend to increase their rate of consumption of alcohol, cannabis, cocaine and opioids more rapidly than men. This has been consistently reported among women who use those substances and is known as "telescoping". Another difference is that women are more likely to associate their drug use with an intimate partner, while men are more likely to use drugs with male friends.

Women who have experienced childhood adversity internalize behaviours and may use drugs to self-medicate

Internalizing problems such as depression and anxiety are much more common among women than among men. Men are more likely than women to suffer from externalizing behaviour problems such as conduct disorder, attention-deficit hyperactivity disorder and anti-social personality disorder. Women with substance use disorders are reported to have high rates of post-traumatic stress disorder and may also have experienced childhood adversity such as physical neglect, abuse or sexual abuse. Women who use drugs may also have responsibilities as caregivers, and their drug use adversely affects their families, in particular children. Such adverse childhood experiences can be transgenerational and impart the risks of substance use to the children of women with drug use disorders.

Post-traumatic stress disorder among women is most commonly considered to have derived from a history of repetitive childhood physical and sexual abuse. Childhood adversity seems to have a different impact on males and females. Research has shown that boys who have experienced childhood adversity use drugs as a means of social defiance. On the other hand, girls who have experienced adversity are more likely to internalize it as anxiety, depression and social withdrawal and are more likely to use substances for self-medication.

Gender-based violence is reportedly higher among women who use drugs

Gender-based violence comprises multiple forms of violence against women, including childhood sexual abuse, intimate-partner violence, non-partner assault as well as trafficking in women and their sexual exploitation. Some studies show that women who use drugs have a two to five times higher prevalence of gender-based violence than women (who do not use drugs) in the general population.

Women are at a higher risk for infectious diseases than men

Women make up one third of drug users globally and account for one fifth of the global estimated number of PWID. Women have a greater vulnerability than men to HIV, hepatitis C and other blood-borne infections. Many studies have reported female gender as an independent predictor of HIV and/or hepatitis C among PWID, particularly among young women and those who have recently initiated drug injection.

Relationship between women and the drug trade not well understood

Women may not only be victims, but also active participants in the drug trade

Women play important roles throughout the drug supply chain. Criminal convictions of women who presided over international drug trafficking

organizations — particularly in Latin America, but also in Africa — attest to this. Women's involvement in opium poppy cultivation in Afghanistan and coca cultivation in Colombia is well documented, as is the role that women play in trafficking drugs, as drug "mules".

However, there is a lack of consistent data from Governments to enable a deeper understanding of those roles: 98 countries provided sex-disaggregated drug-related crime data to UNODC for the period 2012–2016. Of the people arrested for drug-related offences in those countries during that period, some 10 per cent were women.

As suggested in several studies, women may become involved in drug trafficking to sustain their own drug consumption; however, as shown in other studies, some women involved in trafficking in drugs are victims of trafficking in persons, including trafficking for the purposes of sexual exploitation.

Women's participation in the drug supply chain can often be attributed to vulnerability and oppression, where they are forced to act out of fear. Moreover, women may accept lower pay than men: some researchers have noted that women may feel compelled to accept lower rates of payment than men to carry out drug trafficking activities, which means that some drug trafficking organizations may be more likely to use women as "mules".

Another narrative has emerged critiquing this approach and arguing that women might be empowered key actors in the drug world economy. Cases have also been documented in which women are key actors in drug trafficking, by choice. Neither explanation provides a complete picture of women's involvement in the drug supply chain — some are victims, others make their own decisions. Involvement in the illicit drug trade can offer women the chance to earn money and achieve social mobility, but it can also exacerbate gender inequalities because they may still be expected to perform the traditional gender roles of mothers, housekeepers and wives.

Overall, although a multiplicity of factors are behind the participation of women in the drug trade, it has been shown to be shaped by socioeconomic vulnerability, violence, intimate relationships and economic considerations.

Women suffer serious long-term social and health consequences of incarceration related to drug use and drug-related offences

The proportion of women sentenced for drug-related offences is higher than that of men. In some countries, drug-related offences account for the first or second cause of incarceration among women and between the second and fourth cause among men, who are more often incarcerated for other crimes. It has been argued that, as a result of the targeting of low-level drug offences, women may be disproportionately incarcerated for drug offences.

Women often suffer more than men with serious long-term consequences from incarceration that affect several aspects of their lives. In most instances, on the basis of gender-neutral principles, women are subject to the same correctional procedures as men, which do not take the particular aspects of gender into consideration.

Women who are incarcerated have even less access than their male counterparts to health-care services to address their drug use, other health conditions and sexual and reproductive health needs. In addition, fewer women than men generally receive enough preparation and support for their return to the family or to the community in general.

Upon release from prison, women face the combined stigma of their gender and their status as ex-offenders and face challenges, including discrimination, in accessing health care and social services. They may also face social isolation, leaving them to continue living in circumstances of social and economic disadvantage and inequality.

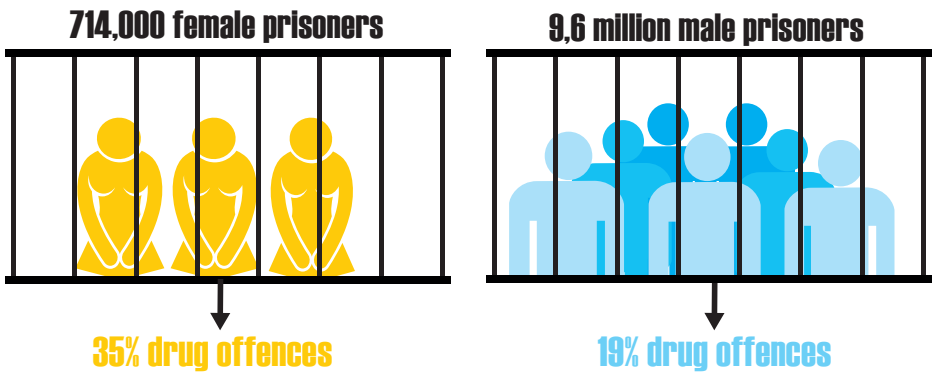
INTRODUCTION

This booklet constitutes the fifth part of the *World Drug Report 2018* and is the second of two thematic booklets focusing on specific population groups. The focus in this booklet is on women. The section on women and drug use focuses on the specific issues related to drug use among women, including gender differences in drug use, the personal, social and environmental factors that can make women vulnerable to drug use and to the development of drug use disorders. The section also discusses the social and health consequences of harmful drug use, as well as access to treatment by women with drug use disorders. The section on women and drug supply contains a discussion of the role played by women in the drug supply chain, in illicit crop cultivation, drug production and drug trafficking; this section also looks at women's contact with the criminal justice system.

Sustainable Development Goals relating to women and the drug problem

Within the 2030 Agenda for Sustainable Development, the Sustainable Development Goals address issues related to both women and the world drug problem. For example, Goal 3 is aimed at ensuring healthy lives and promoting well-being at all ages; Goal 5 is aimed at achieving gender equality and empowering all women and girls; Goal 8 is aimed at promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; Goal 10 is aimed at reducing inequality within and among countries; and Goal 16 is aimed at promoting peaceful and inclusive societies for sustainable development.

A higher proportion of women than men are in prison for drug-related offences



Source: Based on Roy Walmsley, "World prison population list", 11th ed. (Institute for Criminal Policy Research, 2016) and Roy Walmsley, "World female imprisonment list", 4th ed. (Institute for Criminal Policy Research, 2017).
Share of prisoners for drug offences based on 50 Member States (UNODC, Special data collections on persons held in prisons (2010-2014), United Nations Surveys on Crime Trends and the Operations of Criminal Justice Systems (UN-CTS).

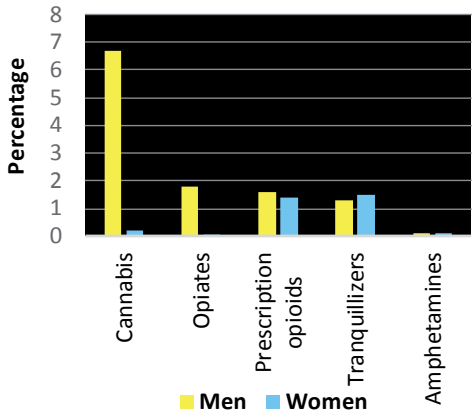
A. WOMEN AND DRUG USE

Many aspects of drug use, including the factors that influence it, have universal elements that span age, culture and gender, yet there are also considerations that are specific to, or more salient among, certain subpopulations, including women. With the aims of developing an understanding of issues relating to drug use among women and of informing the development of policies that account for differences between men and women and the specific needs of women in the prevention of drug use and treatment of drug use disorders, this section covers some specific aspects of drug use among women.

Gender differences in drug use

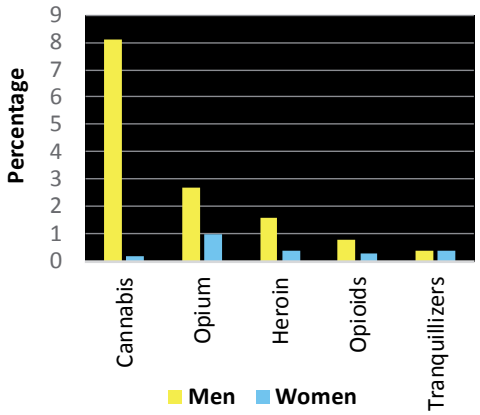
Overall, men are more likely than women to use cannabis, cocaine and opiates, whereas the prevalence of the non-medical use of opioids and tranquillizers is comparable between men and women, if not actually higher among women.[1, 2] Although there is significant variation across cultures, most research on the gender aspects of drug use is focused on developed countries; there is limited research on the topic in other parts of the world. The existing research points to unequal opportunities (also relating to social and cultural norms) in access to illicit drugs as one of the reasons for differences in the prevalence of drug use between men and women;[3, 4, 5, 6] according to this literature, if access to drugs by men and women were equal, the likelihood of substance use would not differ between men and women.[7] Where opportunities for drug use arise, as seen in many Western countries, there is a narrowing gender gap in drug use, especially in the prevalence of recent and current drug use among younger men and women. Furthermore, a growing body of research suggests that substance use disorders can be considered as part of the externalizing

FIG. 1 Annual prevalence of drug use among men and women aged 15–64, Pakistan, 2013



Source: UNODC and Pakistan, Ministry of Interior and Narcotics Control, "Drug use in Pakistan 2013" (2014).

FIG. 2 Annual prevalence of drug use among men and women aged 15–64, Afghanistan, 2009



Source: UNODC, "Drug use in Afghanistan: 2009 survey" (2009).

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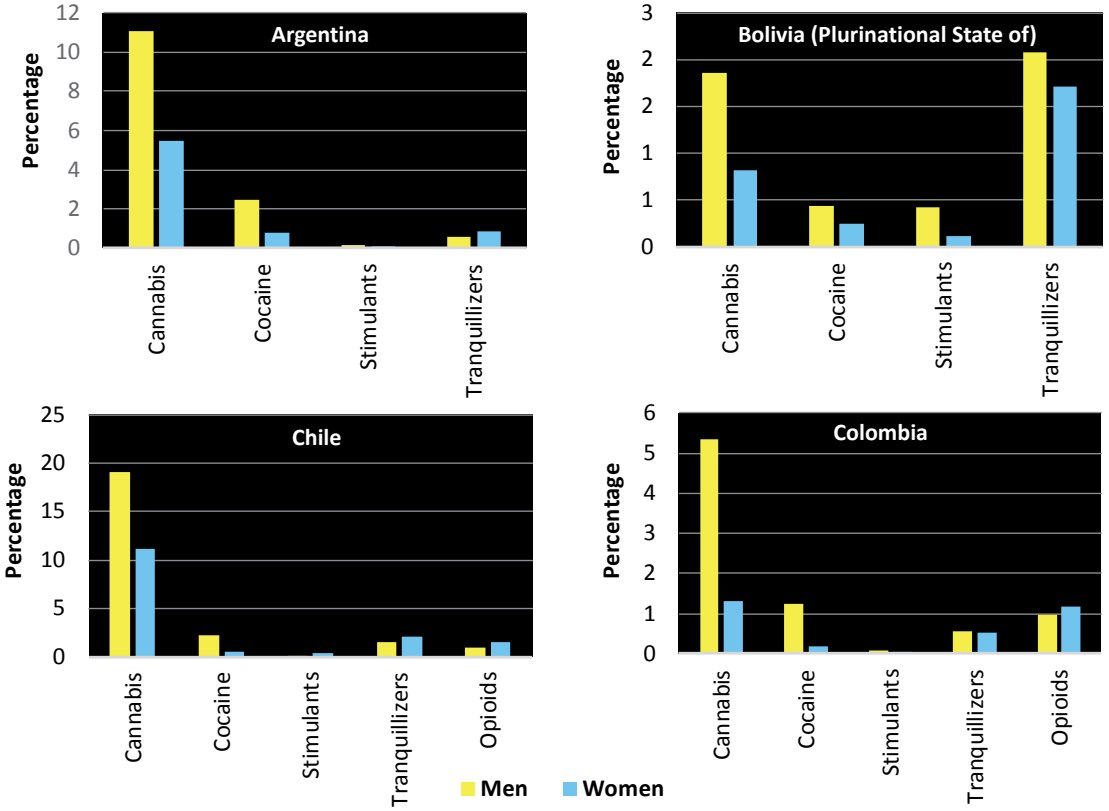
FIG. 3 Annual prevalence of drug use among men and women aged 15–64, selected countries in South America



Source: UNODC, responses to the annual report questionnaire. The reference years for the data are: 2017 for Argentina; 2013 for Bolivia (Plurinational State of); 2014 for Chile 2014 and 2013 for Colombia.

behaviour spectrum, as opposed to the internalizing behaviour spectrum.[8] Men generally have more externalizing behaviour problems (such as conduct disorder, attention-deficit hyperactivity disorder and anti-social personality disorder) than women, whereas women have more internalizing symptoms, such as depression or anxiety (see also the section entitled "Drugs and young people" in the fourth part of the *World Drug Report 2018*).

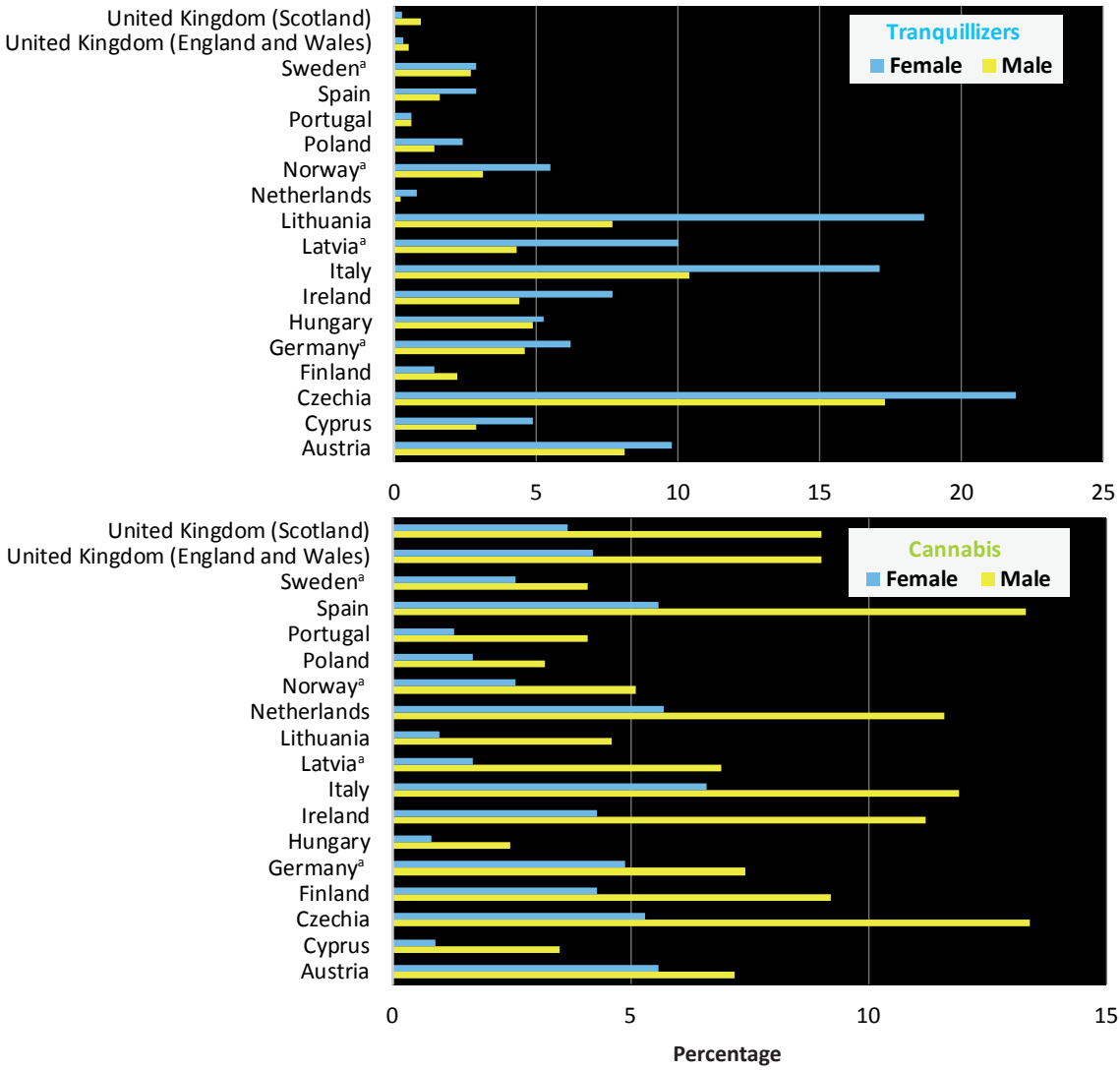
While it is difficult to construct global or regional estimates of drug use among men and women, some country-specific examples are presented here to highlight differences in and patterns of drug use among men and women. The information presented in this section on the extent of drug use among women is based on available data and does not represent the situation in a particular region.

In keeping with gendered roles and norms as well as the social and cultural influences affecting men and women — influences that impose sanctions on drug use among women more than among men — the prevalence of use of most substances in countries in South-West Asia remains low among women.[9] This difference in drug use between men and women is more evident in the case of drugs such as cannabis and opium that have a long history and established use in the subregion. In Pakistan, the use of drugs such as cannabis and opiates is much higher among men than among women; negligible use of those substances is reported among women. The non-medical use of opioids and tranquillizers, however, is at a comparable level between men and women.

8 Hecksher and Hesse, "Women and substance use disorders".

9 See, for example, Amir Ghaderi and others, "Gender differences in substance use patterns and disorders among an Iranian patient sample receiving methadone maintenance treatment", *Electronic Physician,* vol. 9, No. 9 (September 2017).

FIG. 4 Annual prevalence of cannabis use and non-medical use of tranquillizers among those aged 15–64, selected countries in Europe, 2016 or latest year from 2011



Source: UNODC, responses to the annual report questionnaire.

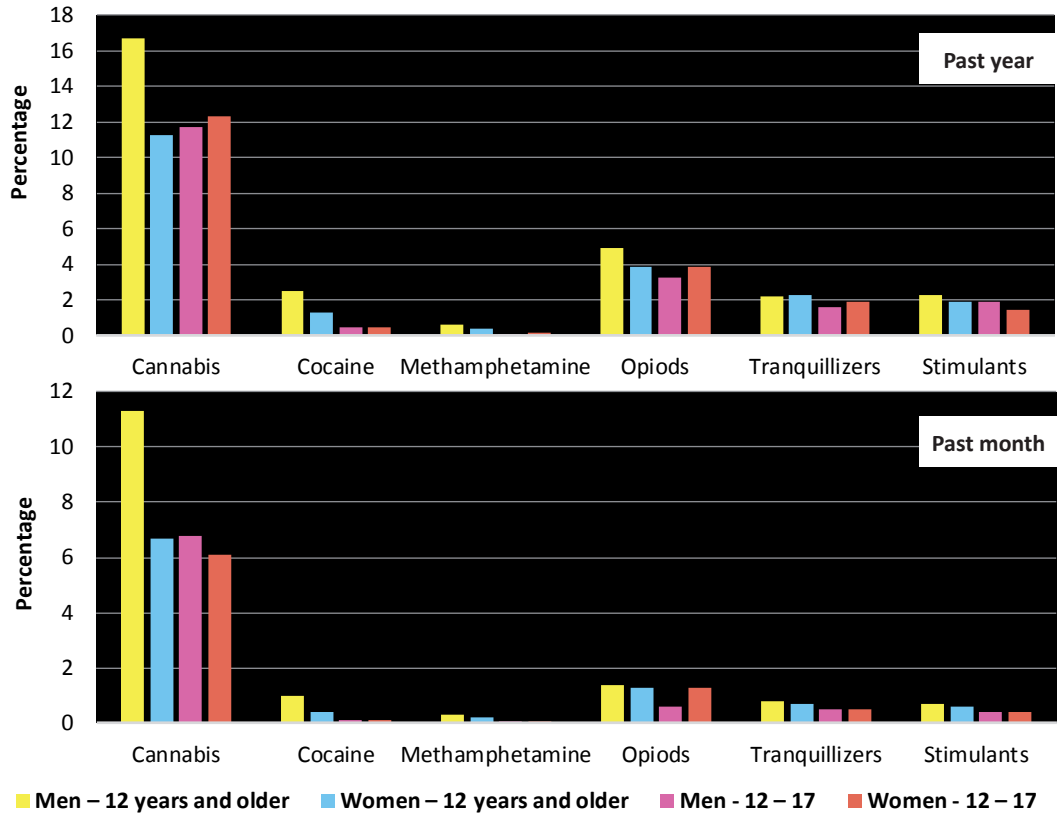
[a] *The data on cannabis use and non-medical use of tranquillizers refer to different years of surveys for which data are available.*

Similarly, the non-medical use of tranquillizers is at similar levels and the difference between men and women in the use of opium is less than that in the use of other drugs. One reason for this may be the lack of access to adequate health services in Afghanistan, which may lead women to self-medicate with opium for relief from numerous ailments.

The extent of cannabis and cocaine use in many South American countries follows the pattern described above, being higher (ranging from two to four times higher) among men than women, whereas the non-medical use of tranquillizers and opioids is reported at comparable levels among men and women.

In Western and Central Europe, men are two to three times more likely than women to use drugs. However, in some countries in the subregion (for which data were available), the non-medical use of tranquillizers is not only, on average, higher among women than among men, but in some countries it

FIG. 5 Annual and past-month prevalence of drug use among men and women aged 12 years and older and those aged 12–17, United States of America, 2016



Source: United States of America, Substance Abuse and Mental Health Services Administration, Center for Behavioural Health Statistics and Quality, *Results from the 2016 National Survey on Drug Use and Health*: Detailed Tables (Rockville, Maryland, 2017).

Note: The data on opioids include the non-medical use of prescription opioids and the use of heroin; the data on tranquillizers and stimulants refer to the non-medical use (misuse) of these substances.

also affects a higher percentage of the adult population than other types of drug use (across gender).

The extent of drug use among men and women in the general population (12 years and older) in the United States shows a similar pattern to that seen in other countries, but the gender gap in the use of most illicit drugs is less pronounced than that observed elsewhere. Moreover, the use of all substances by young women (aged 12–17 years) is on a par with, or even in some instances exceeds, that of their male counterparts.

Personal, social and environmental factors

There are many reasons why men are more likely than women to initiate drug use and progress to drug use disorders, but these issues are not covered here. The scientific literature shows that processes of drug use initiation, social factors and characteristics related to drug use, biological effects and progression to the development of drug use disorders vary considerably between men and women.[10, 11, 12] Research also shows that women typically begin using substances later than men and that substance use by women is strongly influenced by intimate partners who also use drugs.[13] Women are more

10 Christine E. Grella, "From generic to gender-responsive treatment: changes in social policies, treatment services, and outcomes of women in substance abuse treatment", *Journal of Psychoactive Drugs*, vol. 40, SARC Suppl. No. 5 (November 2008), pp. 327–343.

11 Tuchman, "Women and addiction".

12 McHugh and others, "Sex and gender differences in substance use disorders".

13 Kathleen T. Brady and Carrie L. Randall, "Gender

likely to associate their drug use with intimate partner relationships, while men are more likely to use drugs with male friends.[14] Some of the personal, social and environmental factors specific to the initiation of substance use and to the development of substance use disorders among women are discussed in the present section.

Women with drug use disorders are likely to have post-traumatic stress disorder or to suffer from chronic pain

Women are more likely than men to identify trauma and/or stressors such as relationship problems, environmental stress and family problems as causes for their initiation or continuation of substance use.[15] One example of such emotional stressors is childhood adversity: women who experience childhood adversity are reportedly more susceptible to initiating drug use and to developing drug use disorders more rapidly than men (see the subsection on women who have experienced childhood adversity and abuse, below).[16] It is also considered that sex differences in neuroendocrine adaptations to stress and reward systems may mediate women's susceptibility to drug use and its development into harmful use.[17] For instance, compared with men, women who are dependent on substances can have an impaired coping mechanism to respond to stress and a diminished regulation of emotions as a result of a weakened neuroendocrine stress response (blunted adrenocorticotropic hormone and cortisol).[18, 19]

As a result of differences in pain perception between the sexes, females report more severe pain and more frequent bouts of pain that is more anatomically diffuse and longer lasting than that of males with similar disease processes.[20, 21, 22] This is one of the reasons for which, compared with men, women, in particular those aged 45 or older, are more likely to be prescribed opioid painkillers, are more likely to use them for long periods and, therefore, are more susceptible to developing opioid use disorders.[23]

Increased vulnerability to a combination of mood and anxiety disorders, particularly post-traumatic stress disorder, is associated with substance use disorders among women.[24] As reported by WHO and shown in other research, lifetime rates of mood and anxiety disorders are significantly higher among women than men — with and without substance use disorders.[25, 26, 27] Women with substance use disorders are reported to have high rates of post-traumatic stress disorder; for example, in a study in the United States of America, reported rates of post-traumatic stress disorder ranging between 30 per cent and 59 per cent among women with substance use disorders were reported.[28] Post-traumatic stress disorder among women is most commonly considered to have derived from a history of repetitive childhood physical and sexual abuse. Rates of dual diagnosis of post-traumatic stress disorder and substance use disorders for men are two to three times lower, and typically result from combat or crime

differences in substance use disorders", *Psychiatric Clinics of North America*, vol. 22, No. 2 (June 1999), pp. 241–252.

14 Tuchman, "Women and addiction".

15 Ibid.

16 Lindsay Oberleitner and others, "Childhood stressors differentially affect age of first use and telescoping across women and men", *Drug and Alcohol Dependence*, vol. 140 (July 2014), pp. e164–e165.

17 Greenfield and others, "Substance abuse in women".

18 Ibid.

19 Helen C. Fox and Rajita Sinha, "Sex differences in drug-related stress-system changes: implications for treatment in substance-abusing women", *Harvard Review of Psychiatry*, vol. 17, No. 2 (April 2009), pp. 108–119.

20 Cynthia I Campbell and others, "Age and gender trends in long-term opioid analgesic use for noncancer pain", *American Journal of Public Health*, vol. 100, No. 12 (December 2010), pp. 2541–2547.

21 Robert W. Hurley and Meredith C. Adams, "Sex, gender, and pain: an overview of a complex field", *Anaesthesia and Analgesia*, vol. 107, No. 1 (July 2008), pp. 309–317.

22 Roger B. Fillingim and others, "Sex, gender, and pain: a review of recent clinical and experimental findings", *Journal of Pain*, vol. 10, No. 5 (May 2009), pp. 447–85.

23 Ibid.

24 Lisa M. Najavits, Roger D. Weiss and Sarah R. Shaw, "The link between substance abuse and posttraumatic stress disorder in women", *American Journal on Addictions*, vol. 6, No. 4 (Fall 1997), pp. 273–283.

25 WHO, *Gender Disparities in Mental Health* (Geneva).

26 Kevin P. Conway and others, "Lifetime comorbidity of DSM-IV mood and anxiety disorders and specific drug use disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions", *Journal of Clinical Psychiatry*, vol. 67, No. 2 (February 2006), pp. 247–257.

27 Vandad Sharifi and others, "Twelve-month prevalence and correlates of psychiatric disorders in Iran: the Iranian Mental Health Survey, 2011", *Archives of Iranian Medicine*, vol. 18, No. 2 (February 2015).

28 Najavits, Weiss and Shaw, "The link between substance abuse and posttraumatic stress disorder in women".

trauma.[29, 30] Among women, mood and anxiety disorders, including post-traumatic stress disorder, are often reported prior to substance use initiation, while among men, they are more often secondary to the diagnosis of substance use disorders.[31]

One possible explanation for higher rates of women who suffer from drug use disorders along with other psychiatric disorders could be that substance use is less normative for women than for men, and that those women who develop substance use disorders may represent a more severely affected population at higher risk of psychiatric co-morbidity. An alternative explanation is that women with psychiatric disorders are more likely than men to use substances to self-medicate and are therefore at higher risk of developing secondary substance use disorders.[32]

Women tend to progress rapidly from initiation of substance use to the development of substance use disorders

While women may typically begin using substances later than men and to a lesser extent than men, once they have initiated substance use, women tend to increase their rate of consumption of alcohol, cannabis, cocaine and opioids more rapidly than men.[33] This has been consistently reported among women who use those substances and is known as "telescoping"; this term is used in scientific literature to describe an accelerated progression from the initiation of substance use to the development of substance use disorders and entry into treatment. Compared with men, despite having used drugs for a shorter period of time, women with substance use disorders who enter treatment usually have a more severe profile of medical, behavioural and social problems.[34]

29 Ibid.

30 Masoumeh Amin-Esmaeili and others, "Epidemiology of illicit drug use disorders in Iran: prevalence, correlates, comorbidity and service utilization results from the Iranian Mental Health Survey", *Addiction*, vol. 111, No. 10 (October 2016), pp. 1836–1847.

31 Monica L. Zilberman and others, "Substance use disorders: sex differences and psychiatric comorbidities", *Canadian Journal of Psychiatry*, vol. 48, No. 1 (February 2003).

32 Ibid.

33 Brady and Randall, "Gender differences in substance use disorders".

34 Greenfield and others, "Substance Abuse in Women".

Women who use drugs are more likely to have suffered gender-based violence

Gender-based violence is a serious human rights violation that disproportionately affects women. It includes childhood sexual abuse, intimate partner violence, non-partner assault, and trafficking for sexual exploitation. Global estimates produced by WHO indicate that approximately one in three women worldwide experience physical and/or sexual intimate partner violence or non-partner sexual violence in their lifetime.[35] While estimates of the extent of gender-based violence against women who use drugs are scarce, studies, for instance among clinical and community-based samples of women who use drugs in the United States, show a prevalence of gender-based violence among women who use drugs that is two to five times higher than among women who do not use drugs.[36] Some elements of gender-based violence are described in the subsections on childhood adversity, the role of intimate partners and sex workers, below.

Women who have experienced childhood adversity and abuse internalize behaviours and use substances more often to self-medicate

In the scientific literature, "childhood adversity" has been defined as experiences, before 18 years of age, of emotional, physical and sexual abuse, physical neglect and household dysfunction, including parental use of substances. Research shows that different forms of childhood maltreatment and adversity are associated with an increased likelihood of initiation of substance use at an early age, as well as with the likelihood of developing substance use disorders.[37]

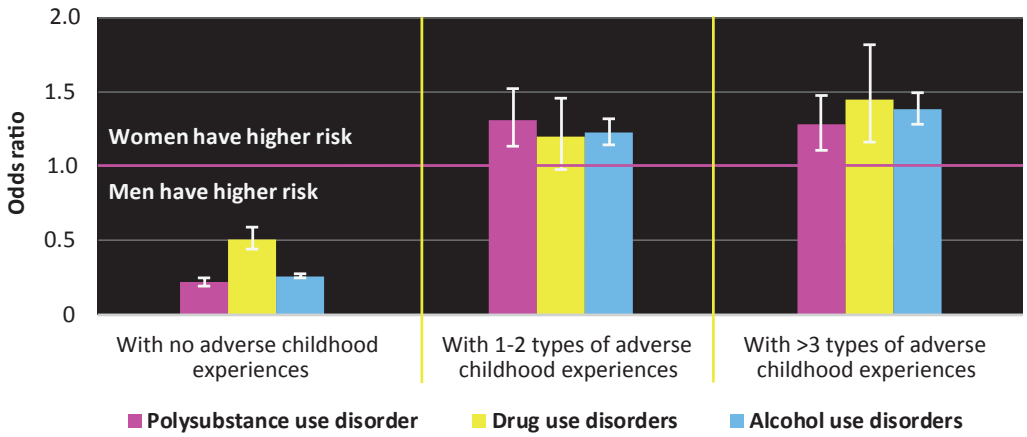
Adverse childhood experiences can generate negative emotions such as guilt, shame or self-devaluation.

35 WHO, *Global and Regional Estimates of Violence against Women: Prevalence and Health Effects of Intimate Partner Violence and Non-Partner Sexual Violence* (Geneva, 2013).

36 Louisa Gilbert and others, "Targeting the SAVA (substance abuse, violence and AIDS) syndemic among women and girls: a global review of epidemiology and integrated interventions", *Journal of Acquired Immune Deficiency Syndrome*, vol. 69, Suppl. 2 (June 2015), pp. s118–s127.

37 Tracie O. Afifi and others, "Childhood maltreatment and substance use disorders among men and women in a nationally representative sample", *Canadian Journal of Psychiatry*, vol. 57, No. 11 (November 2012).

FIG. 6 Gender moderation of childhood adversity and risk for lifetime substance use disorder



Source: Elizabeth A. Evans, Christine E. Grella and Dawn M. Upchurch, "Gender differences in the effects of childhood adversity on alcohol, drug, and polysubstance-related disorders", *Social Psychiatry and Psychiatric Epidemiology*, vol. 52, No. 7 (July 2017), pp. 901–912.

Note: Compared with men, women with no adverse childhood experiences (ACE) have lower risk of substance use disorders; the risk increases among women alongside the increase in the number of adverse childhood experiences.

However, they seem to have a different impact on men and women. Research has shown that boys who have experienced childhood adversity tend to externalize their behaviour as aggression and impulsivity and to use drugs as a means of social defiance. On the other hand, girls who have experienced childhood adversity are more likely to internalize it as anxiety, depression and social withdrawal and are also more likely to use substances for self-medication.[38]

A study among 19,209 women and 13,898 men in the United States showed that, overall, men were more likely than women to use alcohol and drugs and to suffer from alcohol and drug use disorders. However, the study showed that exposure to more types of childhood adversity increased women's risk for drug use disorders to levels that approximated or exceeded those seen among men. Exposure to more types of childhood adversity narrowed the gender difference in the risk of developing an alcohol use disorder, but it widened the gender difference in the risk of developing a polysubstance use-related disorder.[39]

For women who have not experienced childhood adversity, and do not have enhanced emotional stressors, the risk of onset of substance use disorders is lower than for men.[40] As explained in the fourth part of the *World Drug Report 2018,* in the section entitled "Drugs and young people", childhood abuse, neglect and instability are transgenerational and impart a high risk of initiating drug use and developing substance use disorders to the children of individuals who have experienced childhood adversity and families that have experienced abuse and neglect.[41, 42]

Intimate male partners frequently shape the pattern of a woman's drug use and the related harm

Being in a relationship with a person who uses drugs has been shown to be significantly associated with a woman's initiation into and continuation of drug use. Women who use drugs are likely to have had a male intimate partner who initiated them into drug

38 Elizabeth A. Evans, Christine E. Grella and Dawn M. Upchurch, "Gender differences in the effects of childhood adversity on alcohol, drug, and polysubstance-related disorders", *Social Psychiatry and Psychiatric Epidemiology*, vol. 52, No. 7 (July 2017), pp. 901–912.

39 Ibid.

40 Ibid.

41 Iris Torchalla and others, "'Like a lots happened with my whole childhood': violence, trauma, and addiction in pregnant and postpartum women from Vancouver's Downtown Eastside", *Harm Reduction Journal*, vol. 12, No. 1 (2015).

42 Fifa Rahman and others, "Pain, instability, and familial discord: a qualitative study into women who use drugs in Malaysia", *Harm Reduction Journal*, vol. 12, No. 52 (2015).

use; they are also likely to ask the male partner to inject them, including in a social setting where others are present.[43, 44] Women also have less control than men over how and from whom they acquire their drugs, injecting equipment and paraphernalia and are more likely to have those supplied by a male partner. As men are more likely than women to either inject themselves or be injected by another acquaintance (mostly male), in most situations, the woman is injected after the male partner has injected himself, i.e., the woman is injected "second on the needle".[45] All of these factors have unique implications for women, especially with regard to their increased risk of acquiring HIV and hepatitis C as compared with men.

Gender power dynamics also play a key role in women's drug use patterns and related harms. Many qualitative studies have described circumstances in which the male partner, especially one who is also using drugs, is dominant and is the main provider of food and other basic needs and may compel the woman to continue using drugs or discourage her from seeking treatment. It may also be difficult for a woman to negotiate safe behaviours such as use of clean needles and syringes[46] or the use of condoms. In situations where women's intimate partners provide them with drugs, there is often the expectation that they will have sex in return, which points to a gender power imbalance that is intensified by substance use.[47] In these circumstances, a woman's refusal to have sex or her attempts to negotiate condom use may trigger further aggression from her partner, especially if he is under the influence of drugs.[48]

Male dominant behaviours as expressed in gender-based violence can also indirectly affect women's drug use. Women may use drugs in the aftermath of abuse to self-medicate and to cope with the emotional and physical pain of experiencing intimate partner violence.[49] A global review of epidemiology and of interventions to address gender-based violence found that intimate partner violence significantly increases risk of acquiring HIV by between 28 and 58 per cent among different populations of women, including women who use drugs.[50]

Sex workers face greater risk of coercion and violence when they use drugs

In cases where a woman who uses drugs is also a sex worker, gender power dynamics become even more unequal.[51] For many women who use drugs, transactional sex may take place in exchange for money or drugs.[52] This often occurs in perilous, inequitable circumstances, which increases women's likelihood of experiencing coercive sex and limit their negotiating power.[53] Furthermore, women who use drugs and engage in sex work may also be routinely exposed to structural forms of gender-based violence from clients, pimps, drug dealers and police officers.[54] Sex workers who use or inject drugs may be

43 Anna Roberts, Bradley Mathers and Louisa Degenhardt, *Women Who Inject Drugs: a Review of Their Risks, Experiences and Needs*, (Sydney, National Drug and Alcohol Research Centre, University of New South Wales, 2010), p. 8.

44 Charles M. Cleland and others, "HIV risk behaviors among female IDUs in developing and transitional countries", *BMC Public Health*, vol 7, No. 271 (2007).

45 Nabila El-Bassel, Assel Terlikbaeva and Sophie Pinkham, "HIV and women who use drugs: double neglect, double risk", *The Lancet*, vol. 376, No. 9738 (31 July 2010), pp. 312–314.

46 Janie Simmons, Sonali Rajan and James M. McMahon, "Retrospective accounts of injection initiation in intimate partnerships", *International Journal of Drug Policy*, vol. 23, No. 4 (July 2012), pp. 303–311.

47 Louisa Gilbert, and others, "Partner violence and sexual HIV risk behaviors among women in methadone treatment", *AIDS and Behaviour*, vol. 4, No. 3 (September 2000), pp. 261–269.

48 Paula Braitstein and others, "Sexual violence among a cohort of injection drug users" *Social Science and Medicine*, vol. 57, No. 3 (August 2003), pp. 561–569.

49 Alessandra Simonelli, Caterina E. Pasquali and Francesca De Palo, "Intimate partner violence and drug-addicted women: from explicative models to gender-oriented treatments", *European Journal of Psychotraumatology*, vol. 5, No. 1 (2014).

50 Gilbert and others, "Targeting the SAVA (substance abuse, violence and AIDS) syndemic among women and girls".

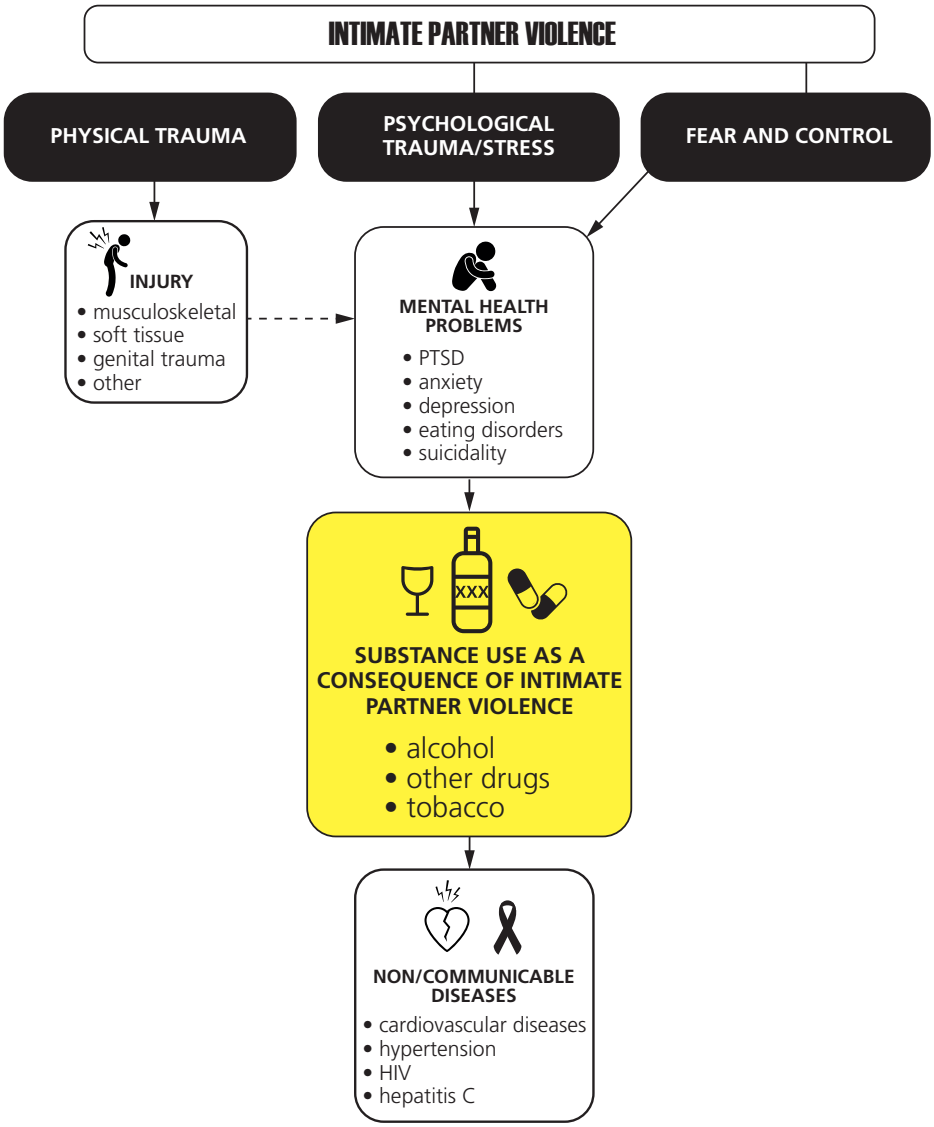
51 Kate Shannon and others, "Social and structural violence and power relations in mitigating HIV risk of drug-using women in survival sex work", *Social Science and Medicine*, vol. 66, No. 4 (February 2008), pp. 911–992.

52 Rafael A. Guimarães and others, "Transactional sex among noninjecting illicit drug users: implications for HIV transmission", *The Scientific World Journal* (2016).

53 Jing Gu and others, "Social environmental factors and condom use among female injection drug users who are sex workers in China", *AIDS and Behavior*, vol. 18, Suppl. 2 (February 2014), pp. 181–191.

54 Shannon and others, "Social and structural violence and power relations in mitigating HIV risk of drug-using women in survival sex work".

FIG. 7 | Pathway for women who initiate drug use as a result of intimate partner violence



Source: UNODC elaboration from WHO, Global and Regional Estimates of Violence against Women: Prevalence and Health Effects of Intimate Partner Violence and Non-Partner Sexual Violence (Geneva, 2013).

shunned from entertainment venues and displaced to street settings or less centrally located areas where they are less safe and more likely to be pressured into unprotected sex, and where services to prevent HIV and other health consequences may be scarce.[55] Such inequities that result from gendered social relations further contribute to women's compounded adverse health effects.[56]

55 Steffanie A. Strathdee and others, "Substance use and HIV among female sex workers and female prisoners: risk environments and implications for prevention, treatment, and policies", *Journal of Acquired Immune Deficiency Syndrome*, vol. 69, Suppl. 2 (1 June 2015), pp. s110–s117.

56 Gina M. Wingood and Ralph J. DiClemente, "Application of the theory of gender and power to examine HIV-related exposures, risk factors, and effective interventions for women" *Health Education and Behavior*, vol. 27, No. 5 (October 2000).

Social inequalities and lack of social and economic resources make women more vulnerable to drug use and drug use disorders

While poverty alone does not cause anyone to initiate drug use, neighbourhoods with extreme poverty are often characterized by a lack of opportunities for personal attainment and economic growth, poor general health and drug use — conditions that may disproportionally affect women.[57] For example, in a study in the United Kingdom of Great Britain and Northern Ireland, the use of heroin, crack and cocaine among homeless women was higher than that among homeless men.[58] Women entering treatment for drug use disorders have generally lower levels of education than their male counterparts — a characteristic observed in studies from different regions.[59, 60] While financial deprivation alone does not cause drug use, multiple factors associated with financial deprivation, such as familial and interpersonal instability, high incidence of mental health disorders and low school completion rates, result in a situation where a lack of social and economic resources make women increasingly vulnerable to using drugs.

Gender stereotyping and stigma can trap women who use drugs in their drug-using networks

The stigma faced by women who use drugs is a significant factor in the way that drug use evolves among women, which interplays with a number of other factors, such as gender based violence, adverse childhood experiences, psychiatric comorbidities, discussed in the present section. Women who use drugs face greater stigma than their male counterparts because of gender-based stereotypes that hold women to different standards;[61] drug use by women is seen as contravening their traditional role in society as mothers and caretakers.[62] Increased stigma is also associated with homeless women who use drugs, which causes them to stay more entrenched within drug-using networks and spend less time with non-drug using networks that could be potential sources of help for treatment and care.[63]

Health and social consequences of drug use among women

Women who use drugs are more vulnerable to HIV and other blood-borne infections

Although fewer women use and inject drugs than men – women account for 20 per cent of the global estimate of people who inject drugs[64] – in terms of risks, women who use drugs have a greater vulnerability than men to HIV and other blood-borne infections. This is not only for biological reasons, but also because of gender power imbalances; for example, being unable to negotiate condom use, being injected after an intimate male partner has injected himself with the same needle and being involved in sex work. Although there are no global, gender-disaggregated prevalence estimates for HIV and hepatitis C, many studies in multiple settings have reported gender as an independent predictor of HIV and/or hepatitis C risk among women who inject drugs, particularly among young women and those who have recently initiated drug injection.[65]

57 Robert Kaestner, "Does Drug Use Cause Poverty?", Working Paper No. 6406 (Cambridge, United Kingdom, National Bureau of Economic Research, February 1998).

58 Homeless Link, "Women and homelessness", Research Briefing (London, September 2015). Available from www.homeless.org.uk.

59 Wendee M. Wechsberg, S. Gail Craddock and Robert L. Hubbard, "How are women who enter substance abuse treatment different than men?: a gender comparison from the Drug Abuse Treatment Outcome Study (DATOS)", *Drugs and Society*, vol. 13, Nos. 1 and 2 (2008), pp. 97–115.

60 Kate Dolan and others, "Six-month follow-up of Iranian women in methadone treatment: drug use, social functioning, crime, and HIV and HCV seroincidence", *Substance Abuse and Rehabilitation*, vol. 3, Suppl. 1 (January 2012), pp. 37–43.

61 Patricia O'Brien, *Making It in the Free World: Women in Transition from Prison* (Albany, New York, State University of New York Press 2001).

62 Julia Kensy and others, "Drug policy and women: addressing the negative consequences of harmful drug control", Briefing Paper (London, International Drug Policy Consortium, 2012).

63 Joan S. Tucker and others, "Homeless women's personal networks: implications for understanding risk behavior", *Human Organization*, vol. 68, No. 2 (Summer 2009), pp. 129–140.

64 Louisa Degenhardt and others, "Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: a multistage systematic review", *The Lancet Global Health*, vol. 5, No. 12 (December 2017), pp. e1192–e1207.

65 Steffanie A. Strathdee and others, "Sex differences in risk factors for HIV seroconversion among injection drug users: a 10-year perspective", *Archives of Internal Medicine*, vol.

A meta-analysis of data from 14 high prevalence countries with an HIV prevalence of over 20 per cent among people who inject drugs found higher HIV rates among women who inject drugs than among their male counterparts, although the overall effect size was modest.[66]

Women who use drugs during pregnancy adversely affect their newborn child

Drug use among women may also result in several pregnancy complications, such as neonatal abstinence syndrome, low birth weight and premature birth. Neonatal abstinence syndrome mainly refers to opioid withdrawal, experienced by infants born to women who continue to use opioids during pregnancy. The clinical manifestations of the syndrome vary and may range from mild tremors and irritability to fever, excessive weight loss and seizures. Clinical signs typically develop within the first few days after birth, but the timing of their onset, as well as the severity of the symptoms, can vary. Other effects on newborns resulting from a mother's use of opioids may include low birth weight, premature delivery and small head and circumference.[67] However, for women with opioid use disorders, opioid agonist therapies during pregnancy have been proved to significantly reduce health risks to both mother and foetus.[68] Cocaine use during pregnancy may also cause serious problems relating to blood pressure, spontaneous miscarriage and premature delivery, among others. Research shows that infants born to mothers who use cocaine during pregnancy are born with a low birth weight, have a smaller head circumference and are shorter than those born to mothers who do not use cocaine.[69] While there is mixed evidence on whether cannabis use by women during pregnancy is associated with low birth weight or premature birth, long-term cannabis use may elevate those risks. Research has shown that women who used cannabis during pregnancy had a two to three times greater risk of stillbirth[70] and that risk of preterm birth and low birth weight increased among women who used cannabis in the second and third trimester of pregnancy.·[71] Research has also shown that some babies born to women who used cannabis during pregnancy display altered responses to visual stimuli, increased trembling and a high-pitched cry,[72] which could indicate problems with neurological development.

As described above, a higher proportion of women than of men who enter treatment with drug use disorders are diagnosed with psychiatric co-morbidities including anxiety, depression and post-traumatic stress disorder, which remain important determinants in treatment outcome for women with drug use disorders.

Mothers who suffer from drug use disorders risk the health and development of their children

The impact of harmful drug use is visible not only on the person who uses drugs but also in the family context. This is particularly true for women, as they are often expected to play a traditional role in terms of supporting their family. Families, spouses or partners and children can suffer long-lasting emotional, financial and physical effects as a result of women's problematic drug use. Spouses or partners of women who use drugs are affected differently, depending on whether they use drugs or not. Such drug use may cause conflict for non-drug-using spouses, while spouses who use drugs may have their drug use reinforced; the latter may act as a barrier to

161, No. 10 (2001), pp. 1281–1288.

66 Don C Des Jarlais and others, "Are females who inject drugs at higher risk for HIV infection than males who inject drugs: an international systematic review of high seroprevalence areas", *Drug and Alcohol Dependence,* vol. 124, Nos. 1 and 2 (1 July 2012), pp. 95-107. According to that study, if men had a risk of 1, the likelihood (odds ratio) of women having HIV was 1.18.

67 Karen McQueen and Jodie Murphy-Oikonen, "Neonatal abstinence syndrome", *New England Journal of Medicine*, vol. 375, No. 25 (22 December 2016), pp. 2468–2479.

68 WHO, *Guidelines for the Identification and Management of Substance Use and Substance Use Disorders in Pregnancy* (Geneva, 2014).

69 National Institute on Drug Abuse, "What is cocaine?", Research Reports (Bethesda, Maryland, United States, May 2016).

70 National Institute on Drug Abuse, "Marijuana", National Institutes of Health, United States Department of Health and Human Services, May 2018).

71 Marleen M. H. J. van Gelder and others, "Characteristics of pregnant illicit drug users and associations between cannabis use and perinatal outcome in a population-based study", *Drug and Alcohol Dependence*, vol. 109, Nos. 1–3 (June 2010), pp. 243–247.

72 P. A. Fried and J. E. Makin, "Neonatal behavioural correlates of prenatal exposure to marihuana, cigarettes and alcohol in a low risk population", *Neurotoxicology and Teratology*, vol. 9, No. 1 (January/February 1987), pp. 1–7.

accessing drug treatment, HIV prevention or social support services. Drug use disorders among women who are the head of their family can result in economic and housing instability for their immediate family.[73] Women who use drugs are also more likely to report that they suffered familial instability in childhood, pointing to an intergenerational cycle of instability and drug use.[74] It has been reported in several studies that the impact of fathers' drug use is less significant than mothers' drug use on subsequent drug use by children.[75]

As children are emotionally and financially dependent on their parents, harmful parental drug use, especially that by the mother in societies where they have the role of caregiver, can affect them in the long term. Periods of intensive or escalating drug use undermine household stability as the needs of children can become secondary to those imposed by the drug problem, resulting in neglect of children. Furthermore, the health of young children may be at risk when a parental focus on or preoccupation with drugs leads to lapses in the child's well-being, and parental inattention may lead to inconsistent regard for child safety and supervision.[76] Several studies have also shown that children with a parent or parents with drug use disorders also take on more adult responsibilities, for example, taking care of the drug-using parent, taking on decision-making roles in the family, taking care of younger siblings and worrying about parental drug use ("parentification").[77, 78]

73 Ellen L. Bassuk and others, "Homelessness in female-headed families: childhood and adult risk and protective factors", *American Journal of Public Health*, vol. 87, No.2 (February 1997), pp. 241–248.

74 Megan J. Rutherford, David S. Metzger and Arthur I. Alterman, "Parental relationships and substance use among methadone patients: the impact on levels of psychological symptomatology", *Journal of Substance Abuse Treatment*, vol. 11, No. 5 (September/October 1994), pp. 415–423.

75 Joseph Gfroerer, "Correlation between drug use by teenagers and drug use by older family members" *The American Journal of Drug and Alcohol Abuse*, vol. 13, Nos. 1 and 2 (1987), pp. 95–108.

76 Marina Barnard and Neil McKeganey, "The impact of parental problem drug use on children: what is the problem and what can be done to help?", *Addiction*, vol. 99, No. 5 (2002), pp. 552–559.

77 Robert E Godsall and others, "Why some kids do well in bad situations: relation of parental alcohol misuse and parentification to children's self-concept", *Substance Use and Misuse*, vol. 39, No. 5 (April 2004), pp. 789–809.

78 Oriella Cattapan and Jolyon Grimwade, "Parental illicit drug use and family life: reports from those who sought help", *Australia and New Zealand Journal of Family Therapy*, vol. 29, No. 2 (June 2008), pp. 77–87.

Access to treatment and care for drug use disorders

Considering the different contexts in and complex pathways by which women initiate drug use and develop drug use disorders, as well as the presence of medical and psychiatric co-morbidities, there remains a general lack of understanding of the specific needs of women and a lack of appropriate drug treatment services that take into account the diverse needs of women with drug use disorders. This situation is more worrisome in resource-constrained countries, where there is a limited availability of scientific evidence-based treatment services in general and of those tailored to meet the specific needs of women in particular.

Women face more barriers to accessing services and a lack of integrated drug treatment and childcare services

Women encounter significant systemic, structural, social, cultural and personal barriers in accessing treatment for drug use disorders.[79] At the structural level, the most significant obstacles include lack of childcare and punitive attitudes towards mothers and pregnant women with substance use disorders. As mentioned earlier, pregnant women who use drugs have special needs with regard to their health in general, as well as to their pregnancy. Pregnant women with drug use disorders present a challenge to health-service providers because drug use may impact both the mother and the unborn child. Where there is a lack of services or where punitive attitudes prevail, women fear seeking treatment as this may result in losing custody of their children or having to relinquish their children as a condition of treatment.

Drug treatment services may also be located far from where women live and may have inflexible admission requirements and schedules that may not suit the needs of women, especially those with childcare

79 See, for example, Erick G. Guerrero and others, "Barriers to accessing substance abuse treatment in Mexico: national comparative analysis by migration status", *Substance Abuse Treatment, Prevention, and Policy*, vol. 9, No. 30 (July 2014).

responsibilities.[80, 81] Moreover, women with children may still need to secure childcare to participate in outpatient treatment programmes as they may not have enough money to pay for childcare costs, transport or the treatment itself. The lack of childcare services integrated within drug treatment, and even in services aimed at reducing the adverse social and health consequences caused by drug use, is a significant hindrance to women accessing those services, as the decision to access treatment may conflict with their childcare responsibilities.

Women with drug use disorders often enter treatment with a history of emotional and physical abuse and have limited social capital and support. Furthermore, because of the trauma they suffer from psychiatric disorders, in particular, anxiety, depression or post-traumatic stress disorder, medical and psychiatric co-morbidities among women may be more severe than among their male counterparts.

In many societies, drug use both in general and among women is heavily stigmatized, resulting in women who use drugs being a more hidden population than men who use drugs. Cultural norms may therefore make it difficult for women to acknowledge their drug problem and to leave their homes and families to undergo treatment. Since many women with drug use disorders also live with a partner or other family member using drugs, relationship issues and the role of drug use within the relationship remain central issues in women seeking support for drug treatment. A growing body of evidence suggests that drug treatment services that provide social services and attend to other gender-specific needs can contribute to better engagement, retention in treatment and improved treatment outcomes.[82, 83]

80 Erick G. Guerrero and others, "Gender disparities in utilization and outcome of comprehensive substance abuse treatment among racial/ethnic groups", *Journal of Substance Abuse Treatment*, vol. 46, No. 5 (May–June 2014), pp. 584–591.

81 Christine E. Grella, "From generic to gender-responsive treatment: changes in social policies, treatment services, and outcomes of women in substance abuse treatment", *Journal of Psychoactive Drugs*, vol. 40, Suppl. 5 (November 2008), pp. 327–343.

82 UNODC, *Guidelines on Drug Prevention and Treatment for Girls and Women* (Vienna, April 2016).

83 "International standards for the treatment of drug use disorders: draft for field testing" (E/CN.7/2016/CRP.4).

B. WOMEN AND DRUG SUPPLY

While research on issues related to women who use drugs has improved in recent years, little consideration has yet been given to understanding the participation of women in the supply side (related to illicit drug crop cultivation, drug production and drug trafficking) of the drug problem. Moreover, few studies have addressed women's contact with the criminal justice system, its consequences and the impact of the participation of women in drug supply on the lives of the women involved. It is generally considered that drug trafficking organizations are predominantly operated by men and that the role played by women in drug trafficking is relatively insignificant compared with that of their male counterparts.[84, 85] Globally, the majority of drug traffickers are men, but the issue of gender has not been taken into consideration in much of the research on drug trafficking. The present section contains information from the limited studies and reports that have covered the role of women in drug cultivation, production and trafficking in order to provide an insight into the specific aspects of women's involvement in drug supply and into the effects that this involvement has on women.

The information in the present section covers three main issues: (a) the role of women in illicit crop cultivation and drug production; (b) the role of women in drug trafficking; and (c) women's contact with the criminal justice system for drug-related offences.

Role of women in illicit drug crop cultivation and drug production

The illicit cultivation of drugs often takes place in areas where rule of law is weak and where there is conflict or violence perpetrated by armed groups. The implication is that people in such areas have limited or no access to basic services including education, sanitation and health care. In Afghanistan, for example, there is evidence that opium poppy is

84 Council on Hemispheric Affairs, "The rise of femicide and women in drug trafficking", 28 October 2011.

85 Elena Azaola and others, "What roles are women playing in Mexico's drug war?", Inter-American Dialogue, 25 August 2011.

Difficulties in evaluating the extent of women's involvement in drug cultivation and production

Generally, the "supply-side approach" to monitoring drug production and cultivation is focused on locations, the size of plantations and the value or quantity of drugs, rather than on the people involved. The two most common ways used to evaluate the extent of drug production are through "direct indicators", related to the cultivation or eradication of plants, as well as satellite data used to estimate the extent of plant-based drugs plantations; and through "indirect indicators", such as drug seizures and the origin or destination of the drugs involved, provided by law enforcement authorities, or the amount of seized precursor chemicals used in the illicit manufacture of different drugs.

Although these are useful approaches, there is still a gap in information for evaluating, in a systematic way, who produces a drug, to what extent they are involved, and the gender specific aspects of the people involved in the drug supply chain.

Sources: *The Drug Problem in the Americas (Washington, D.C., OAS, 2013); World Drug Report 2017* (United Nations publication, Sales No. E.17.XI.6 United Nations system task force on transnational organized crime and drug trafficking as threats to security and stability, "A gender perspective on the impact of drug use, the drug trade, and drug control regimes", Policy Brief (2014).

cultivated in areas with a very strong culture of gender inequality: opium poppy cultivation is more likely to occur in villages where girls have no access to schools.[86]

Women living in such areas suffer the worst consequences of poverty, are paid low wages or not paid at all, and lack other opportunities for economic self-reliance and access to education and health-care services.[87] For instance, in Afghanistan women living in areas where opium poppy is cultivated and where there is a structural absence of economic opportunities have reported that the income generated from opium poppy cultivation enables them to pay for household necessities such as food, furniture and clothes.[88]

Illicit drug cultivation generally increases the average income of households but it does not necessarily provide financial or social benefits to women or result in a redistribution of power between women and men. Women who participate in the cultivation of illicit crops are also expected to perform the traditional gender roles of mothers, housekeepers and wives, resulting in increasingly demanding workloads. Such an intense workload may have an impact on intergenerational development and the transfer of traditional skills to children.[89] In Afghanistan in 2016, a survey found that about half of the women in households not involved in the cultivation of opium poppy were able to perform remunerated jobs (47 per cent); in contrast, just over a third of women in households involved in the cultivation of opium poppy were able to do the same (37 per cent). Most working women in households not involved in the cultivation of opium poppy earned income through handicrafts such as weaving, while most working women in households involved in the cultivation of opium poppy were agricultural workers paid by the day.[90]

Research in Afghanistan shows that women play a largely passive role in terms of decision-making in opium cultivation, with few influencing the decision by the man of the household to cultivate opium poppy or not.[91] Women and children provide unpaid labour in the cultivation of opium poppy, as cultivating and harvesting opium poppy is a very labour-intensive operation. Women participate in labour-intensive processes such as weeding and clearing fields, lancing and breaking opium poppy capsules to remove and clean seeds, and preparing opium gum ready for sale. Women also produce by-products of opium, such as oil and soap.

In Latin America, by contrast, women play a more active decision-making role during the different phases of coca bush cultivation and cocaine production. They are mainly involved in the initial stages,

86 *World Drug Report 2015* (United Nations publication, Sales No. E.15.XI.6).

87 Afghanistan, Ministry of Counter Narcotics and UNODC, *Sustainable Development in an Opium Production Environment: Afghanistan Opium Survey Report 2016* (Vienna, 2017).

88 *World Drug Report 2016* (United Nations publication, Sales No. E.16.XI.7).

89 Kensy and others, "Drug policy and women".

90 *Sustainable Development in an Opium Production Environment.*

91 *World Drug Report 2016*, p. 24.

namely the cultivation and harvesting of coca leaf, but not much information is available on the participation of women in the later phases of cocaine production, which are more specialized, require qualified people, including chemists, and typically involve only men.[92]

In certain parts of Colombia, households involved in coca cultivation have suffered consequences linked to the presence of illegal armed groups, which have resulted in increased levels of violence and barriers to social and economic mobility, especially for women.[93] These conditions have affected both men and women but, when accessing public services, women have had to carry the burden of double stigma: being a woman and being part of a household that cultivates coca. On the other hand, women have played a unique supporting role in defining solutions to illicit crop cultivation in Latin America. For example, the involvement of women has ensured the successful implementation of many alternative and sustainable development interventions in areas with illicit crop cultivation.[94]

Cannabis cultivation takes place in most countries, including in urban areas and in indoor cultivation sites with the help of new technology, [95, 96] but little is known about the roles played by the men and women involved. Through studies in Africa, particularly in countries in southern Africa, it has been observed that many older women and housewives in rural areas engage in the cultivation of cannabis as a means of sustaining their households. It has been argued that the presence of these women in cannabis cultivation is a result of the fact that their partners and other male members of their families are often absent because they go to urban areas in search of work, or because they have died, often from an AIDS-related illness.[97]

Cannabis plant cultivation is particularly attractive in southern Africa because it is easier to grow in arid and mountainous regions than conventional cash crops such as wheat or maize, and is not affected by drought, fluctuating seed prices or the cost of machinery and fertilizer, unlike other crops. While cannabis plant cultivation may predominantly involve women, its end products (cannabis) are usually given to male or female "agents" who ensure its transportation to strategic locations or to final consumer markets in urban centres.[98]

In the case of the manufacture of amphetamines, research has shown that women can play the role of both "cooks" and "shoppers" (the latter purchase or obtain supplies for manufacture). Cooks, who can be of either sex, are highly valued in the amphetamine production chain.[99] Although the "cooking" of methamphetamine is often considered to be a predominantly male activity, a number of cases suggest the involvement of women in the process.[100, 101] For example, in the State of Missouri in the United States, a survey showed that in 40 per cent of cases of methamphetamine laboratory seizures, women actively involved in the manufacture, sale or use of methamphetamine were arrested.[102]

Role of women in drug trafficking

In the 98 countries that provided data disaggregated by sex during the period 2012–2016 to UNODC, 90 per cent of the people who were brought into contact with the criminal justice system for drug-related offences were men. The proportion of women brought into contact with the criminal justice system for drug trafficking offences globally was

92 Roberto Laserna, "Coca cultivation, drug trafficking and regional development in Cochabamba, Bolivia", PhD dissertation, University of California at Berkeley, 1995, p. 170–175.

93 María Clara Torres Bustamante, *Coca, Política y Estado: El caso de Putumayo* (Bógota, Universidad Nacional de Colombia, 2012).

94 *World Drug Report 2015.*

95 Martin Bouchard, "Towards a realistic method to estimate cannabis production in industrialized countries", *Contemporary Drug Problems*, vol. 35, Nos. 2 and 3 (2008), pp. 291–320.

96 Evan Mills, "The carbon footprint of indoor *Cannabis* production", *Energy Policy*, vol. 46 (July 2012), pp. 58–67.

97 Annette Hübschle, "Of bogus hunters, queenpins and mules: the varied roles of women in transnational organized crime in Southern Africa", *Trends in Organized Crime*, vol. 17 (2014) pp. 31–51.

98 Ibid.

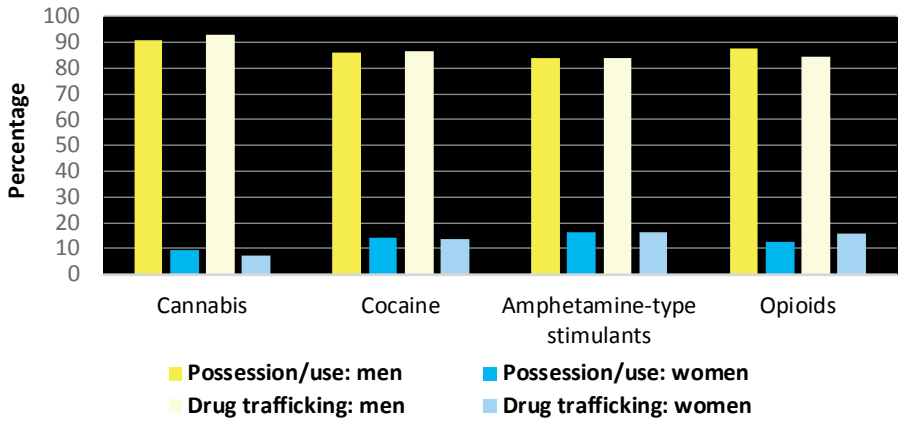
99 Robert Jenkot, "'Cooks are like gods': hierarchies in methamphetamine-producing groups", *Deviant Behavior*, vol. 29, No. 8 (2008), pp. 667–689.

100 Ibid.

101 Hübschle, "Of bogus hunters, queenpins and mules".

102 Robert Jenkot, "'Cooks are like gods': hierarchies in methamphetamine-producing groups", *Deviant Behavior*, vol. 29, No. 8 (2008), pp. 667–689.

FIG. 8 Proportion of men and women brought into contact with the criminal justice system for drug possession, use and for trafficking, by drug type (2012–2016)



Source: UNODC, responses to the annual report questionnaire.

Note: The data come from 63 countries for cannabis, 56 countries for cocaine, 49 countries for amphetamine-type stimulants and 50 countries for opioids. The countries are from different regions and have provided sex-aggregated data in response to questions on persons brought into contact with the criminal justice system for drug offences during the period 2012–2016.

Important considerations when interpreting data on women and drug trafficking

The interest in identifying women's roles in drug trafficking is relatively recent and most of the data and studies available are rarely disaggregated by sex. Furthermore, information and studies considering gender specificities tend to be more focused on women's consumption of drugs, and on the impact on their lives and children as a result of drug use disorders.

The current information reported to UNODC provides a breakdown by sex of the number of people brought into contact with the criminal justice system for drug offences. Data on drug law offenders reflect the priorities and targeting strategies, as well as the activities and effectiveness, of drug law enforcement agencies in different countries, which identify people involved in drug offences and seize the drugs they may have in their possession, rather than showing the true extent to which women and men are involved in drug trafficking.

10 per cent, although it varied widely, from 1 per cent or less in some countries to 40 per cent in others, with many countries reporting a proportion of between 7 and 16 per cent.

While there are no comprehensive global data on trends relating to women arrested for drug-related offences, there is a widespread perception that the number of women arrested for participating in the illicit drug trade is on the rise worldwide, in particular among women who lack education or economic opportunity or who have been victims of abuse.[103, 104, 105] On the other hand, some available data suggest that, in some regions, the proportion of women among the total number of people brought into contact with the criminal justice system for drug trafficking offences actually declined over the period 2012–2016. It is difficult to ascertain, however, whether this reflects decreasing trends or inconsistent reporting by countries over time. Similarly, it is not clear whether an increase in the number of women arrested for drug trafficking has occurred because there are more women involved in drug trafficking, because reporting and awareness of such offences have improved, because targeting of offences in which women are typically more represented has increased, or because there has been an increase in law enforcement activities relating to drug-related offences.[106]

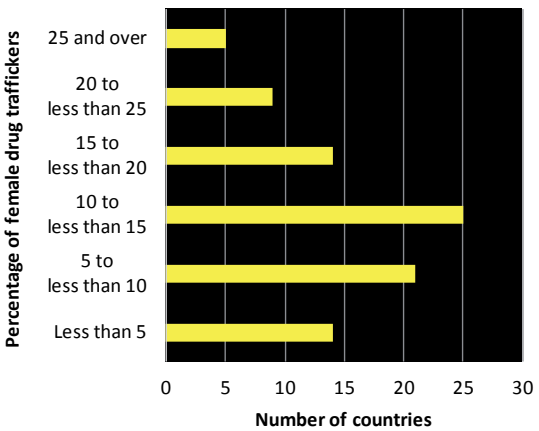
103 Inter-American Commission of Women and Organization of American States, "Women and drugs in the Americas: a policy working paper" (Washington, D.C., 2014).

104 United Nations system task force on transnational organized crime and drug trafficking as threats to security and stability, "A gender perspective on the impact of drug use, the drug trade, and drug control regimes", Policy Brief (2014).

105 Giacomello, "Women, drug offenses and penitentiary systems in Latin America".

106 Ibid.

FIG. 9 Number of countries by proportion (percentage) of women among people brought into contact with the criminal justice system (2012–2016) for drug trafficking offences



Source: UNODC, responses to the annual report questionnaire.
Note: Data from 88 countries.

Activities of and roles played by women in drug dealing and trafficking

A number of studies have focused on the role that women play in drug trafficking, whether as drug "mules" or in low-level drug dealing. However, these are not necessarily the only roles they play; women may have diverse roles in a drug trafficking network, from a leading role in a drug network or trafficking group to a significant or intermediary role, or a lesser or low level-role along the drug supply chain. Although most of the literature on this topic originates in Latin America, the participation of women in drug trafficking networks has also been noted in research in other regions.

Men may still dominate the top positions in drug trafficking organizations, but some women lead drug trafficking groups and are perceived by their male co-workers or law enforcement agents as "professional" drug traffickers or high-level members of the illicit organization. They make key decisions related to both global and regional trafficking in drugs.[107]

It has been argued that women tend to obtain a high level of recognition in drug trafficking organizations through family associations or the death, incarceration or incapacitation of an intimate partner, as a result of which they have gone on to become leaders.[108]

Women playing lead roles in drug trafficking networks

In Latin America, there are many cases of powerful female leaders who have been key symbols of the narco-culture in the region over several decades. Some significant examples are the "drug queens", who run drug trafficking organizations, such as Enedina Arellano Felix,[109] who is believed to have led the Tijuana cartel since 2008. According to different accounts, she started working behind the scenes as a money-launderer for the cartel but, after the arrest of her brother, she became the highest-profile female cartel leader in Mexico.[110] Sandra Avila Beltran, dubbed the "Queen of the Pacific", was a high-profile cartel leader in Mexico who was first indicted in the United States for cocaine trafficking in 2004[111] and arrested in 2007 for money-laundering and drug trafficking.[112] Griselda Blanco, known as "La Madrina", is another example of a woman running a drug trafficking network. Blanco is believed to have been the first to traffic cocaine from Colombia to the United States and is believed to have been involved in trafficking thousands of kilograms of cocaine into the United States between 1975 and the 2000s.[113] Other examples,

107 "Women and drugs in the Americas"http://www.oas.org/en/cim/docs/womendrugsamericas-en.pdf (the roles described in the text were classified in a study developed in Trinidad and Tobago, as described on page 40).

108 Giacomello, "Women, drug offenses and penitentiary systems in Latin America".

109 United States, Department of the Treasury, Office of Foreign Assets Control, "What you need to know about U.S. sanctions against drug traffickers: an overview of the Foreign Narcotics Kingpin Designation Act (21 U.S.C. '1901-1908, 8 U.S.C. '1182) and Executive Order 12978 of October 21, 1995" (Washington, D. C.).

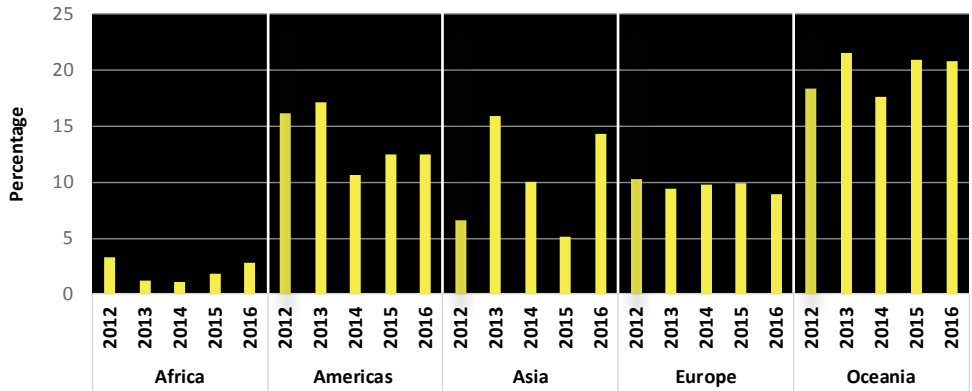
110 Ed Vulliamy, *Amexica: War along the borderline* (Picador, Farrar, Straus and Giroux, New York, 2010).

111 United States Attorney's Office, Southern District of Florida, "Alleged international narcotics trafficker extradited from Mexico on cocaine conspiracy charges", 10 August 2012.

112 Elaine Carey, *Women Drug Traffickers: Mules, Bosses, and Organized Crime* (Albuquerque, United States, University of New Mexico Press, 2014).

113 *United States of America v. Griselda Blanco*, 861 F.2d 773 (United States Court of Appeals for the Second Circuit, 1988). Information on this and related cases can be found

FIG. 10 Proportion of women among those brought in contact with the criminal justice system who are suspected of drug trafficking offences (2012–2016), by region, for any illicit drug



Source: UNODC, responses to the the annual report questionnaire.
Note: Data from 88 countries.

although not in recent times, are numerous women who, in the 1930s and 1940s, ran cannabis, opium, morphine and heroin operations in Mexico. [114]

There are also examples of women in powerful positions in drug trafficking networks in Africa. For instance, in 1993, the ambassador of Burkina Faso to Ghana was a key member of a drug trafficking gang. She facilitated the transport of drugs by allegedly issuing diplomatic passports and providing vehicles.[115] Another example is that of Sheryl Cwele, a high-ranking director of health services in South Africa who, together with an accomplice from Nigeria, Frank Nabolisa, is believed to have been a central player in a transnational cocaine trafficking network.[116] The couple used text messages and emails to recruit female drug couriers[117] before being sentenced in 2011.

Intermediary roles in drug trafficking

At the secondary level in the drug supply chain, the development of an intermediary role by women is relatively common but still not the norm. At this level, women may not play a leading role in a cartel or organized crime group, but their contribution is still significant within the group. One study[118] documented the way in which women reportedly assisted leaders by being financial controllers, supervising drug selling or being personally involved in small-scale drug dealing and selling. Women in these positions may also recruit other women, either through coercion, intimidation or financial compensation, to act as drug couriers. In other cases, such as the Tijuana cartel, women were found to have been operating and managing key functions related to money-laundering.[119]

During the "'crack' crisis" in the United States, women were noted as being successful "crack"

in the case law database of the Sharing Electronic Resources and Laws on Crime (SHERLOC) knowledge management portal of UNODC.

114 In Mexico, the drug culture and the women involved is of such significance that there are many songs related to famous women, such as *Camelia la Tejana* and *Pollitas de cuenta*. This has been related to what some authors have called "*narcocorrido*" culture, in which many stories present women as the main actors, not only as traffickers but also as wives, sisters, mothers and others. See Howard Campbell, "Drug trafficking stories: everyday forms of narco-folklore on the U.S.–Mexico border", *International Journal of Drug Policy*, vol. 16, No. 5 (October 2005), pp. 326–333.

115 Emmanuel Akyeampong, "Diaspora and drug trafficking in West Africa: a case study of Ghana", *African Affairs*, vol. 104, No. 416 (July 2005), pp. 429–447.

116 Judgment of the Supreme Court of Appeal of South Africa, *Sheryl Cwele and Frank Nabolisa v. The State*, case No. 671/11 (1 October 2012).

117 Hübschle, "Of bogus hunters, queenpins and mules".

118 "Women and drugs in the Americas".

119 Louise Shelley, "The relationship of drug and human trafficking".

cocaine dealers.[120, 121, 122] At the intermediate level, many women maintained "house connections" and sold "crack" cocaine to selected clientele among the non-stereotypical, "hidden" population of employed "crack" cocaine users. Many of those "crack" cocaine dealers came from stable family backgrounds and maintained that status. In one example, a dealer offered her apartment to her clients, helped them manage the effects of the drug and helped oversee their finances so that they did not spend all their money on it. She controlled unruly customers, avoided unwanted sexual attention and ensured that she did not attract the attention of the police.[123]

A Norwegian study of women drug dealers and traffickers identified four major strategies that "successful" women drug dealers have adopted in order to establish themselves in an area dominated by men. These strategies were: desexualizing themselves (removing aspects of their femininity); establishing a violent posture and reputation, especially among those who deal with street culture; developing an emotional detachment and being hard-hearted in their social relations; and having a service-minded approach.[124]

Another study of female drug traffickers in Australia looked at how female drug dealers operated when selling amphetamines, heroin or cannabis. All the women interviewed had demonstrated varying degrees of success, based on the amount of money and drugs that had passed through their hands. Some of the aspects described in the study explored how maintaining kin or kin-like relations was an important part of drug dealing. Other aspects included, as shown in the Norwegian study, maintaining a good reputation, trust and reliability. Although threats of, or actual, violence was not commonly reported by the study participants, they had to rely on the reputations of their families or networks to thwart threats of or violence from rival groups.[125]

Women as drug "mules"

A Mexican scholar has pointed out that women may become involved in drug trafficking as a result of the involvement of their male partner in the activity: they may commit crimes in association with their male partner or may be imprisoned because they take responsibility for a crime that he committed.[126] Several studies have shown women operating at the lowest rank in the drug supply chain hierarchy as small-scale dealers, "mules" or couriers,[127] or playing the role of sexual escorts around male dealers.[128, 129] Studies document situations where women are forced to act as drug "mules" through coercion and intimidation,[130, 131] by being deceived into trafficking drugs unwittingly, or in an attempt to help their loved ones.[132, 133]

The role of drug "mules" can involve buying, storing and transporting drugs from one place to

120 Bruce D. Johnson, Eloise Dunlap and Sylvie C. Tourigny, "Crack distribution and abuse in New York", *Crime Prevention Studies*, vol. 11, pp. 19–57.

121 Eloise Dunlap, Bruce D. Johnson and Lisa Maher, "Female crack sellers in New York City: who they are and what they do", *Women and Criminal Justice*, vol. 8, No. 4 (1997), pp. 25–55.

122 Lisa Maher and Kathleen Daly, "Women in the street-level drug economy: continuity or change?", *Criminology*, vol. 34, No. 4 (November 1996), pp. 465–491.

123 Johnson, Dunlap and Tourigny, "Crack distribution and abuse in New York".

124 Heidi Grundetjern and Sveinung Sandberg, "Dealing with a gendered economy: female drug dealers and street capital", *European Journal of Criminology*, vol. 9, No. 6 (2012), pp. 621–635.

125 Barbara Denton and Pat O'Malley, "Gender, trust and business. women drug dealers in the illicit economy", *British Journal of Criminology*, vol. 39, No. 4 (autumn 1999), pp. 513–530.

126 Marcela Lagarde, *Los cautiverios de las Mujeres: Madres, Esposas, Monjas, Putas, Presas y Locas* (Mexico City, Universidad Nacional Autónoma de México, 2003), p. 654.

127 *Women, Drug Policies, and Incarceration*, p. 8.

128 Patricia A. Adler, *Wheeling and Dealing: An Ethnography of an Upper-Level Drug Dealing and Smuggling Community*, 2nd ed. (New York, Columbia University Press, 1993).

129 See also, UNODC, *Personas privadas de libertad por Delitos de Drogas en Panamá: Enfoque socio-jurídico del diferencial por género en la Administración de la Justicia Penal*, 2017.

130 Jennifer Fleetwood, "Drug mules in the international cocaine trade: diversity and relative deprivation", *Prison Services Journal*, No. 192 (November 2010).

131 "Women and drugs in the Americas". See also American Civil Liberties Union, Break the Chains: Communities of Color and the War on Drugs and the Brennan Center at NYU School of Law, *Caught in the Net: The Impact of Drug Policies on Women and Families* (n.p., n.d.).

132 Gabriel I. Anitua and Valeria A. Picco, "Género, drogas y sistema penal. Estrategias de defensa en casos de mujeres 'mulas'" in *Violencia de Género. Estrategias de Litigio para la Defensa de los Derechos de las Mujeres* (Buenos Aires, Defensoría General de la Nación, 2012), p. 220.

133 *Women, Drug Policies, and Incarceration.*

another, internationally or locally, on behalf of others.[134] This role usually represents the lowest level in the drug supply chain, and women and girls doing these secondary, less-qualified and low-paid jobs can easily be replaced.[135, 136] One example observed in Latin America is the use of female drug "mules" who rather than completing a successful drug transaction, serve mainly as decoys to detract attention from a larger-scale drug smuggling carried out by smuggling professionals at international borders. A member of the drugs network tips off the law enforcement personnel of an expected drug delivery by a mule. While this person is arrested another person carrying larger quantities of drugs passes through undetected.[137, 138]

Organized crime groups, as in the case of West African syndicates, are known to use innovative types of modus operandi, including Internet and social networking sites, to recruit drug "mules". Drug "mules" may travel by air, sea or land (car, bus or on foot) and hide drugs in vehicles, luggage, clothes, around their bodies ("body packers") or in their bodies ("drug swallowers"). They have been reported to insert "drug eggs" into their genitalia or swallow latex capsules, balloons or pellets filled with drugs. Latex drug capsules are dangerous and can put the carrier's lives at risk because they can burst or leak, leading to the possibility of intestinal obstruction, overdose and even death.[139] There have been reports of cases of women becoming involved in microtrafficking without knowing the risks they were taking.[140] An example of a trafficking organization that openly recruits drug "mules" is the Yakuza, who have been known to place online advertisements for international couriers to bring drugs into Japan. In one case, a 71-year-old Japanese woman unwittingly carried amphetamines from Egypt to Japan.[141]

Women can become involved in drug trafficking for a number of reasons. As in the case of men, it may be their own personal decision, although driven by economic factors in circumstances where other employment and income options may be limited. However, some factors place women at a higher risk of becoming drug "mules". In Latin America, new family models and roles, together with economic need, may lead to women taking a more prominent role in economic life than in the past, regardless of whether their activities are legal.[142] Drug dealers may also see advantages in recruiting women for their own business benefit; for example, they may take advantage of institutionalized sexism, whereby women avoid being suspected of drug trafficking and other criminal activities by playing on traditional images of femininity.[143, 144] Moreover, women may request or accept lower pay than men; some researchers have noted that women feel compelled to accept lower rates of payment than men to carry out drug trafficking activities.[145]

In recent years, West Africa has become one of the main connecting points of the cocaine trade between Latin America and Europe, as well as of methamphetamine trafficking to East and South-East Asia and South Africa.[146] Some organized crime groups and syndicates from the subregion, principally West African drug syndicate networks,

134 Camille Stengel and Jennifer Fleetwood, "Developing drug policy: gender matters", GDPO Situation Analysis (Swansea, United Kingdom, Global Drug Policy Observatory, August 2014).

135 Ibid.

136 Lisa Maher and Susan L. Hudson, "Women in the drug economy: a metasynthesis of the qualitative literature", *Journal of Drug Issues*, vol. 37, No. 4 (2007), pp. 805–826.

137 Hübschle, "Of bogus hunters, queenpins and mules".

138 UNODC, *Personas privadas de libertad por Delitos de Drogas en Panamá: Enfoque socio-jurídico del diferencial por género en la Administración de la Justicia Penal*, 2017.

139 Giacomello, "Women, drug offenses and penitentiary systems in Latin America".

140 Jennifer Fleetwood, J., "Five kilos: penalties and practice in the international cocaine trade", *British Journal of Criminology*, vol. 51, No. 2 (March 2011), pp. 375–393.

141 Andrew Rankin, "21st-century Yakuza: recent trends in organized crime in Japan", *The Asia-Pacific Journal*, vol. 10, issue 7, No. 2 (2012).

142 Anitua and Picco, "Género, drogas y sistema penal. Estrategias de defensa en casos de mujeres 'mulas'".

143 Maher and Hudson, "Women in the drug economy".

144 Howard Campbell, "Female drug smugglers on the U.S.-Mexico border: gender, crime, and empowerment", *Anthropological Quarterly*, vol. 81 No. 1 (winter 2008), pp. 233–267.

145 Kensy and others, "Drug policy and women".The following example is cited on page 3 of the Briefing Paper: in Kyrgyzstan there was an increase from 5 per cent to 12 per cent of women involved in drug trafficking; that increase was partly explained by women generally accepting lower rates of payment than men.

146 Hai Thanh Luong, "Transnational drugs trafficking from West Africa to Southeast Asia: a case study of Vietnam", *Journal of Law and Criminal Justice*, vol. 3, No. 2 (December 2015), pp. 37-54.

have developed strategies to recruit women living with HIV or other diseases as drug "mules". This is because law enforcement authorities are reluctant to bring them into the criminal justice system and prefer to deport them rather than provide them with health care or because they fear becoming infected themselves.[147] Other African cartels have been known to recruit women, in particular women in vulnerable situations, including Caucasians, women with children, older people and the disabled, as low-profile couriers, as they may face a lower risk of being caught by the authorities.[148]

In South Asia, a large number of women and children are employed by drug traffickers in Bangladesh to carry heroin and bottles of Phensedyl, a codeine-based cough syrup, across the border from India.[149]

It can be argued that women primarily become involved in drug trafficking because they are driven by poverty and financial need.[150, 151] Research from Latin America shows that many women involved in the drug trade come from a background of physical and sexual abuse, violence and a low level of education. The situation of some women is precarious because of their vulnerability, substance use and background of mental illness.[152] In addition, many are responsible for caring for their dependants (children, grandchildren, elderly or disabled family members). Some are single mothers and they become involved in the drug business as a way of contributing to the family income or as an alternative means of sustaining the household.[153]

Studies have shown a crossover between drug trafficking, drug use, prostitution and trafficking in persons. In those studies, situations have been documented of women becoming involved in drug trafficking to sustain their own drug consumption, of sex workers smuggling drugs[154] and of women who were victims of trafficking in persons or trafficking in persons for the purpose of sexual exploitation being forced to smuggle drugs.[155, 156]

The Yakuza and the triads, from Japan and China, respectively, have been linked to trafficking in both persons and drugs for decades. The internationalization of the Yakuza has enabled them to exploit their drug trafficking links in order to traffic women from other regions, in particular South America and Eastern Europe.[157, 158] The triads are involved in both the trafficking for the purposes of sexual exploitation of women from Eastern Europe and drug dealing on a large scale.[159]

In Europe, groups from Turkey or the Balkan countries are known to be involved in trafficking in drugs, trafficking in persons and trafficking in women for the purposes of sexual exploitation. Similarly, in Belgium, groups from Albania use local "madams" to control women who have been trafficked for sexual exploitation and to ensure that they carry drugs. The organized crime group Solntsevskaya, from the Russian Federation, has also played a major role in trafficking in drugs and persons from the former States of the Soviet Union into Eastern Europe.[160]

Overall, there tends to be a multiplicity of factors acting together, in which gender, socioeconomic vulnerability, violence, intimate relations and economic reasons shape the complex relationship between women and the drug economy, in which a stratified and masculine system prevails.[161]

147 Ibid.

148 Liana Sun Wyler and Nicolas Cook, *Illegal Drug Trade in Africa: Trends and U.S. Policy* (Washington, D.C., Congressional Research Service, 2009).

149 Pushpita Das, "Drug trafficking in India: a case for border security", *Institute for Defence Studies and Analyses*, IDSA Occasional Paper No. 24 (May 2012).

150 Rebecca Schleifer and Luciana Pol, "International guidelines on human rights and drug control: a tool for securing women's rights in drug control policy". *Health and Human Rights Journal*, vol. 19, No. 1 (June 2017), pp. 253–261.

151 *Women, Drug Policies, and Incarceration.*

152 Corina Giacomello, "Women in prison for drug crimes in Latin America: an invisible population", 19 December 2013. Available from www.talkingdrugs.org.

153 *Women, Drug Policies, and Incarceration,* p. 8.

154 Hübschle, "Of bogus hunters, queenpins and mules".

155 Liz Hales and Loraine Gelsthorpe, *The Criminalisation of Migrant Women* (Cambridge, United Kingdom, Institute of Criminology, University of Cambridge, 2012).

156 Shelley, "The relationship of drug and human trafficking".

157 Rankin "21st-century Yakuza".

158 Shelley, "The relationship of drug and human trafficking".

159 Glenn E. Curtis and others, "Transnational activities of Chinese crime organizations", *Trends in Organized Crime*, vol. 7, No. 3 (March 2002), pp. 19–57.

160 Shelley, "The relationship of drug and human trafficking".

161 Fleetwood, "Drug mules in the international cocaine trade".

Women in the criminal justice system for drug-related offences

Although the concept and practice of proportional sentencing in relation to drug offences have been recognized by the international community,[162, 163] in some countries, mandatory minimum sentences still apply, irrespective of the specific role played in or the profit gained from a drug-related offence.[164] The array of roles in international drug trafficking is not always reflected in drug laws, or in sentencing.[165, 166, 167] It has also been argued that, since low-level drug trafficking may be easier to control, local law enforcement agencies may focus on that part of the drug supply chain in order to achieve more immediate and visible results.[168] In some countries, for instance in Latin America, drug-related offences account for the first or second cause of incarceration among women, yet only between the second and the fourth cause among men. With mandatory pretrial detention established in some Latin American countries for drug offences,[169] the situation may be more precarious, especially for women.[170, 171]

162 Commission on Narcotics Drugs Resolution 59/7 Promotion of proportionate sentencing for drug-related offences of an appropriate nature in implementing drug control policies.

163 Outcome document of the thirtieth special session of the General Assembly, entitled "Our joint commitment to effectively addressing and countering the world drug problem" (General Assembly resolution S-30/1, annex), para. 4 (j and k).

164 Covington and Bloom, "Gendered justice".

165 Jennifer Fleetwood, Polly Radcliffe and Alex Stevens, "Shorter sentences for drug mules: the early impact of the sentencing guidelines in England and Wales", *Drugs: Education, Prevention and Policy*, vol. 22, No. 5 (2015), pp. 428–436.

166 Maher and Hudson, "Women in the drug economy".

167 Stengel and Fleetwood, "Developing drug policy: gender matters".

168 Sital Kalantry, "Women in prison in Argentina: causes, conditions, and consequences", Public Law Working Paper, No. 439 (Chicago, University of Chicago Press, 2014).

169 Organization of American States, Secretariat for Multidimensional Security and Inter-American Drug Abuse Control Commission, *Technical Report on Alternatives to Incarceration for Drug-Related Offenses* (Washington, D.C., Inter-American Drug Abuse Control Commission, 2015).

170 Cindy S. Woods, "Addressing prison overcrowding in Latin America: a comparative analysis of the necessary precursors to reform", *ILSA Journal of International and Comparative Law*, vol. 22 (2016), pp. 533–561.

171 Giacomello, "Women, drug offenses and penitentiary systems in Latin America".

According to the latest information, women comprise nearly 7 per cent of the global prison population,[172] with more than 714,000 women and girls held in penal institutions throughout the world in 2017, either as pretrial detainees or following conviction and sentencing. The estimated number of women in prisons globally doubled from 2000 to 2017, a disproportionally higher increase than among the male prison population.[173] Globally, between 2010 and 2014, an estimated 35 per cent of women in prison had been convicted for drug-related offences, while the figure for men was 19 per cent.[174] In many countries, there has been a disproportionate increase in the rates of women being imprisoned, including for low-level drug dealing offences.[175] It seems that men are more often incarcerated for other crimes (either concurrent to drug offences or not), thus reducing the relative share of men in prison for drug-related offences. It has also been noted that women are generally less likely than men to be able to afford fines or to pay the surety required for bail. They may also be less aware of their legal rights, and may be ineligible for consideration for non-custodial sanctions and measures if their economic, social and mental vulnerability are assessed as risk factors.[176] While there is little evidence to determine whether there is discrimination against women (in comparison with men) at the sentencing level, some studies suggest that judges and other criminal justice officials do not consider gender inequalities. This is based, in part, on the misconception that the principle of equality before the law does not allow accounting for the distinctive needs of women in order to accomplish substantial gender equality.[177]

172 Roy Walmsley, "World prison population list", 11th ed. (Institute for Criminal Policy Research, 2016).

173 Roy Walmsley, "World female imprisonment list", 4th ed. (Institute for Criminal Policy Research, 2017).

174 According to reports from 50 Member States (UNODC, Special data collections on persons held in prisons (2010–2014)).

175 Report of the Special Rapporteur on violence against women, its causes and consequences, entitled "Pathways to, conditions and consequences of incarceration for women" (A/68/340).

176 See UNODC *Handbook on women and imprisonment*, p 190 and 113 (2014).

177 See, UNODC, *Personas privadas de libertad por Delitos de Drogas en Panamá: Enfoque socio-jurídico del diferencial por género en la Administración de la Justicia Penal*, 2017.

Some research has suggested that the increase in women's imprisonment rates mainly affects ethnic minorities and vulnerable populations.[178] In the case of the United States, for example, over half of the women in federal prisons were incarcerated for drug-related offences, and a disproportionate number of them are Latina and African-American.[179, 180] The same situation occurs in the United Kingdom, where most women imprisoned for drug-related charges are from a minority ethnic background and, along with foreign-born women, are overrepresented in the prison system for these offences.[181, 182]

The vulnerability that drives people into low-level drug trafficking often limits their capacity to face prosecution effectively. This can be particularly problematic for women. As documented in Latin America, when women are arrested for drug-related offences, they risk being abandoned by their relatives, reducing their opportunities to secure a sufficient legal defence, especially in countries with no legal-aid system.[183, 184]

According to data reported to UNODC during the period 2012–2016, the largest numbers of women brought into contact with the criminal justice system for drug trafficking offences were reported in East and South-East Asia and Western and Central and Eastern Europe. The highest proportions of women among those brought into contact with the criminal justice system for drug trafficking offences during that same period were 22 per cent in Central America and 20 per cent in Oceania (data from Australia and New Zealand only).

Women in the criminal justice system for drug-related offences: a regional overview

Worldwide, there are more men than women in prison, both in general and for drug-related offences, but the proportion of women in prison sentenced for drug-related offences is higher than that of men. It seems that men are more often incarcerated for other crimes[185] (either concurrent to drug offences or not), thus reducing the relative share of men in prison for drug-related offences. Some have argued that women are disproportionately incarcerated for drug offences[186] and are more affected than men as they are targeted for low-level drug offences.

According to the latest World Female Imprisonment List, since 2000, the number of women in prison has doubled in Latin America; Brazil, El Salvador and Guatemala have seen a particular increase.[187] Many women are incarcerated for non-violent micro-trafficking offences.[188]

Available data for Europe indicate that the proportion of female prisoners serving sentences for drug-related offences varies considerably, from 5 per cent in Bulgaria, approximately 25 per cent in Denmark, Finland and Sweden and 33 per cent in Italy to 40 per cent in Spain. In Europe, there is less disparity between the proportion of men and women imprisoned for drug-related offences than in other regions.[189]

The number of women in prison in the United States increased more than sixfold between 1978 and 2016, from a rate of 10 per 100,000 female population to 64 per 100,000 female population. This is attributed to a higher proportion of women than men being sentenced for non-violent drug-related offences in the United States in that

178 Rosalyn Harper, Gemma C. Harper and Janet E. Stockdale, "The role and sentencing of women in drug trafficking crime", *Legal and Criminological Psychology*, vol. 7, No. 1 (February 2002), pp. 101–114.

179 Stengel and Fleetwood, "Developing drug policy: gender matters".

180 Kensy and others, "Drug policy and women: addressing the negative consequences of harmful drug control".

181 Prison Reform Trust, *Counted Out: Black, Asian and Minority Ethnic Women in the Criminal Justice System* (London, 2017).

182 Janice Joseph, "Drug offenses, gender, ethnicity, and nationality: women in prison in England and Wales", *The Prison Journal*, vol. 86, No. 1 (2006), pp. 140–157.

183 Inter-American Commission on Human Rights, "Annual report of the IACHR 2007", document OEA/Ser.L/V/II.130, Doc. 22, rev. 1.

184 Alberto Binder, Ed Cape and Zaza Namoradze, *Effective Criminal Defence in Latin America* (Bogotá, Dejusticia, 2015).

185 *Technical Report on Alternatives to Incarceration for Drug-Related Offenses.*

186 Fleetwood, "Five kilos"; and United Nations task force on transnational organized crime and drug trafficking as threats to security and stability, "A gender perspective on the impact of drug use, the drug trade, and drug control regimes".

187 Walmsley, "World female imprisonment list".

188 "Women and drugs in the Americas".

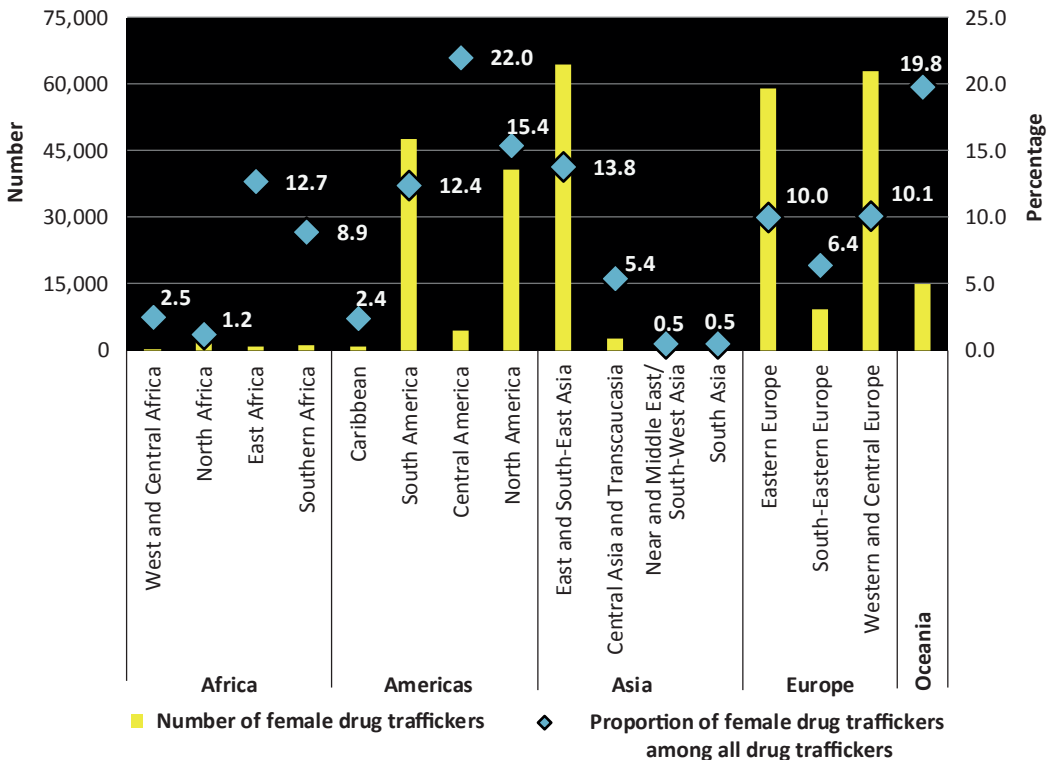
189 UNODC, Special data collections on persons held in prisons (2010-2014).

TABLE 1 People in prison sentenced for drug-related offences in selected countries in Latin America, 2014

	Women			Men		
	Number of women in prison sentenced for drug offences	Proportion of women in prison sentenced for drug related offences, as compared with other offences (%)	Proportion of women sentenced for drug trafficking offences among all women sentenced for drug-related offences (%)	Number of men in prison sentenced for drug offences	Proportion of men in prison sentenced for drug related offences, as compared with other offences (%)	Proportion of men sentenced for drug trafficking offences among all men l sentenced for drug-related offences (%)
El Salvador	12	2	42	47	1	21
Argentina	319	27	NA	1 773	5	NA
Brazil	6,863	56	100	57 296	22	100
Chile	1,356	36	NA	6 422	10	NA
Colombia	2,664	38	100	13 962	13	98
Ecuador	380	53	9	1 783	15	15
Peru	1,359	63	100	6 771	21	100

Source: UNODC, Special data collections on persons held in prisons (2010-2014).

FIG. 11 Number of women brought into contact with the criminal justice system for drug trafficking and their proportion among all those brought into contact with the criminal justice system for drug-trafficking (2012–2016), by subregion, for any illicit drug



Source: UNODC, responses to the annual report questionnaire.

Note: Data from 88 countries.

period.[190] Although more men than women serve prison sentences for drug-related offences in the United States, drug-related crimes account for about 25 per cent of all crimes committed by women, while they comprise only 14 per cent of all such crimes committed by men. In addition, in 2016, 47 per cent of men and 56 per cent of women were imprisoned in the United States federal prison system for drug-related offences.[191] In Canada in the period 2015–2016, while only 5 per cent of offenders in federal custody were women, about 25 per cent of them were serving a sentence for a serious drug offence.[192]

In Asia, data show that, in 2014, the highest percentage of women in prison for drug-related offences was in Thailand (77 per cent of women in prison, compared with 61 per cent of men) followed by Japan (39 per cent), Georgia (38 per cent), Azerbaijan (33 per cent) and the United Arab Emirates (15 per cent). However, in Asia, the overall proportion of men and women in prison sentenced for drug-related offences is comparable.[193]

Women in the drug supply chain: from passive to empowered individuals

Overall, more men than women are involved in activities related to the drug supply chain. Some of the vulnerabilities, such as poverty, lack of education and economic opportunities, that may render a person vulnerable to being exploited by organized crime groups for low-level drug trafficking are experienced by both men and women. In many circumstances, however, women may be more vulnerable than men, given that they may have stronger feelings of responsibility for their family, can be exploited easily by organized crime groups as a result of institutionalized sexism, are less visible to law enforcement agencies and may accept lower wages than men for their services. The evidence available also shows some crossover between trafficking in persons, trafficking in women for sexual exploitation, drug use and drug trafficking. These vulnerabilities may be a product of social structures in which women are seen as passive and non-empowered individuals.

Another perspective presents women as empowered individuals who are not necessarily dependent on or exploited by their male partners, and who play key roles in the drug supply chain based on their own decisions. Although some women do not play merely passive roles, their position in the drug supply chain strongly depends on their social class, networks and place within the drug organizations. Overall, women represent a small percentage of people in prison, but this percentage is increasing. It is not clear, however, if the criminal justice response to sentencing for drug-related offences treats men and women in the same way. While men end up in prison for a broad range of crimes, drug-related crimes are the principal cause of the incarceration of women. What is clear is that women's contact with the criminal justice system has more negative consequences on them than it does on men, exacerbating both their economic vulnerability and their social exclusion.

190 E Ann Carson, "Imprisonment rate of sentenced female prisoners under the jurisdiction of state or federal correctional authorities per 100,000 female U.S. residents" (Washington D.C Bureau of Justice Statistics, 1978-2016).

191 E. Ann Carson, "Prisoners in 2016", (Washington, D.C., Bureau of Justice Statistics, 2018).

192 Tina Hotton Mahony, Joanna Jacob and Heather Hobson, *Women in Canada: A Gender-Based Statistical Report — Women and the Criminal Justice System* (Ottawa, Statistics Canada, 2017.

193 UNODC, Special data collections on persons held in prisons (2010–2014).

Women who are incarcerated for drug-related offences suffer worse consequences than men

Women often suffer more than men with serious long-term consequences from incarceration that affect several aspects of their lives. In most instances, on the basis of gender-neutral principle, women are subject to the same correctional procedures as men.[a] Both drug use and incarceration carry stigma for men and women, but the degree of stigma is much greater for women because of gender-based stereotypes that hold women to different standards.[b] Many women charged with drug-related offences suffer from substance use disorders, psychiatric disorders and a history of physical and sexual abuse.[c, d] Studies indicate that many women arrested for drug-related offences, in particular drug trafficking, had been victims of human or sex trafficking and forced to carry drugs.[e] The standard practices in most custodial settings of search, restraint and isolation can have profound effects on women with a history of abuse, trauma or mental illness and often act as triggers that re-traumatize women who have post-traumatic stress disorder.[f] Forced sex work, sexual abuse and rape of female prisoners is also a common practice in some prisons globally.[g, h] This adds to the abuse and trauma that many women who use drugs might have already suffered, with the overall prison experience exacerbating those conditions and inflicting further physical and psychological trauma to the person. While in prison, few women are provided with the health-care services necessary to address their drug use disorders, other co-morbidities or reproductive health issues. Therefore, the lack of adequate and tailored health-care services in many prisons affects women more than men.

The incarceration of women impacts the lives of their children and families, who are often more dependent on the women than on the men in the family. The separation of children from their mothers is one of the most detrimental aspects of women's incarceration.[i] In an analysis of international prison censuses it was found that when a father was incarcerated, custody of the children was usually assumed by the wife or partner, whereas when a mother was incarcerated, the children remained in the care of their fathers in only 10 per cent of cases.[j] Separation from children therefore causes serious problems for women's mental health and leads to the disintegration of families and, in many cases, the institutionalization of children.[k]

Incarcerated women do not generally receive enough support to prepare for their return to their families, intimate partners and the community. Not only do women have fewer opportunities to access education and training programmes in prison than men, but the skills they learn in prison are mainly recreational and based on gender stereotypes, and fail to provide them with financial remuneration.[l, m] While in prison, women also see their networks, which could help them after release, weakened and their social skills diminished. Upon their release, women face stigma in the community because of their drug use and incarceration. Women therefore face challenges in accessing the necessary health-care and social services, such as housing and employment, and also face social isolation, leaving them to continue living in circumstances of social and economic disadvantage and inequality.[n]

[a] Stephanie S. Covington and Barbara E. Bloom, "Gendered justice: women in the criminal justice system", in Gendered Justice: Addressing Female Offenders, Barbara E. Bloom, ed. (Durham, North Carolina, Carolina Academic Press, 2003).

[b] Juliana van Olphen and others, "Nowhere to go: how stigma limits the options of female drug users after release from jail", Substance Abuse Treatment, Prevention, and Policy, vol. 4, No. 10 (2009).

[c] Ernest Drucker, "Drug law, mass incarceration, and public health", Oregon Law Review, vol. 91, No. 4 (2013), p. 1097–1128.

[d] Kasia Malinowska-Sempruch and Olga Rychkova, "The impact of drug policy on women" (New York, Open Society Foundations, 2015).

[e] Louise Shelley, "The relationship of drug and human trafficking: a global perspective", European Journal on Criminal Policy and Research, vol. 18, No. 3 (September 2012). The author argues that drug trafficking is linked to several forms of trafficking, such as labour trafficking in the agricultural sector and sex trafficking. Some smuggled individuals often pay for their movement to their destination by being drug couriers. In addition, drugs may be used to recruit new victims.

[f] Covington and Bloom, "Gendered justice".

[g] Etienne G. Krug and others, eds., World Report on Violence and Health (Geneva, WHO, 2002).

[h] Center for Justice and International Law, Women in Prison, Regional Report: Argentina, Bolivia, Chile, Paraguay, Uruguay (2007).

[i] Ibid.

[j] Washington Office on Latin America and others, Women, Drug Policies, and Incarceration: A Guide for Policy Reform in Latin America and the Caribbean (2016).

[k] Corina Giacomello, "Women, drug offenses and penitentiary systems in Latin America", Briefing Paper (London, International Drug Policy Consortium, 2018).

[l] Marta Cruells and Noelia Igareda, eds., Women, Integration and Prison (Barcelona, Spain, Aurea Editores, 2005).

[m] Ana Cárdenas T., Mujeres y Cárcel: Diagnóstico de las Necesidades de Grupos Vulnerables en Prisión (Santiago, Universidad Diego Portales-ICSO, 2010).

[n] Van Olphen and others, "Nowhere to go".

GLOSSARY

amphetamine-type stimulants — a group of substances composed of synthetic stimulants controlled under the Convention on Psychotropic Substances of 1971 and from the group of substances called amphetamines, which includes amphetamine, methamphetamine, methcathinone and the "ecstasy"-group substances (3,4-methylenedioxymethamphetamine (MDMA) and its analogues).

amphetamines — a group of amphetamine-type stimulants that includes amphetamine and methamphetamine.

annual prevalence — the total number of people of a given age range who have used a given drug at least once in the past year, divided by the number of people of the given age range, and expressed as a percentage.

coca paste (or coca base) — an extract of the leaves of the coca bush. Purification of coca paste yields cocaine (base and hydrochloride).

"crack" cocaine — cocaine base obtained from cocaine hydrochloride through conversion processes to make it suitable for smoking.

cocaine salt — cocaine hydrochloride.

drug use — use of controlled psychoactive substances for non-medical and non-scientific purposes, unless otherwise specified.

new psychoactive substances — substances of abuse, either in a pure form or a preparation, that are not controlled under the Single Convention on Narcotic Drugs of 1961 or the 1971 Convention, but that may pose a public health threat. In this context, the term "new" does not necessarily refer to new inventions but to substances that have recently become available.

opiates — a subset of opioids comprising the various products derived from the opium poppy plant, including opium, morphine and heroin.

opioids — a generic term applied to alkaloids from opium poppy (opiates), their synthetic analogues (mainly prescription or pharmaceutical opioids) and compounds synthesized in the body.

problem drug users — people who engage in the high-risk consumption of drugs; for example, people who inject drugs, people who use drugs on a daily basis and/or people diagnosed with drug use disorders (harmful use or drug dependence), based on clinical criteria as contained in the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association, or the International Classification of Diseases and Related Health Problems (tenth revision) of the World Health Organization.

people who suffer from drug use disorders/people with drug use disorders — a subset of people who use drugs. People with drug use disorders need treatment, health and social care and rehabilitation. Harmful use of substances and dependence are features of drug use disorders.

harmful use of substances — defined in the International Statistical Classification of Diseases and Related Health Problems (tenth revision) as a pattern of use that causes damage to physical or mental health.

dependence — defined in the International Statistical Classification of Diseases and Related Health Problems (tenth revision) as a cluster of physiological, behavioural and cognitive phenomena in which the use of a substance or a class of substances takes on a much higher priority for a given individual than other behaviours that once had greater value. A central descriptive characteristic of dependence syndrome is the desire (often strong, sometimes overpowering) to take psychoactive drugs.

substance or drug use disorders — the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association also refers to "drug or substance use disorder" as patterns of symptoms resulting from the use of a substance despite experiencing problems as a result of using substances. Depending on the number of symptoms identified, substance use disorder may vary from moderate to severe.

prevention of drug use and treatment of drug use disorders — the aim of "prevention of drug use" is to prevent or delay the initiation of drug use, as well as the transition to drug use disorders. Once a person develops a drug use disorder, treatment, care and rehabilitation are needed.

REGIONAL GROUPINGS

The *World Drug Report* uses a number of regional and subregional designations. These are not official designations, and are defined as follows:

- East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, Uganda and United Republic of Tanzania
- North Africa: Algeria, Egypt, Libya, Morocco, South Sudan, Sudan and Tunisia
- Southern Africa: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe
- West and Central Africa: Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone and Togo
- Caribbean: Antigua and Barbuda, Bahamas, Barbados, Bermuda, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines and Trinidad and Tobago
- Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama
- North America: Canada, Mexico and United States of America
- South America: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela (Bolivarian Republic of)
- Central Asia and Transcaucasia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- East and South-East Asia: Brunei Darussalam, Cambodia, China, Democratic People's Republic of Korea, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Singapore, Thailand, Timor-Leste and Viet Nam
- South-West Asia: Afghanistan, Iran (Islamic Republic of) and Pakistan
- Near and Middle East: Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, United Arab Emirates and Yemen
- South Asia: Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka
- Eastern Europe: Belarus, Republic of Moldova, Russian Federation and Ukraine
- South-Eastern Europe: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, Romania, Serbia, the former Yugoslav Republic of Macedonia and Turkey
- Western and Central Europe: Andorra, Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom of Great Britain and Northern Ireland
- Oceania: Australia, Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu and small island territories

UNODC
United Nations Office on Drugs and Crime

UNODC Research

Following last year's 20th anniversary edition, the *World Drug Report 2018* is again presented in a special five-booklet format designed to enhance reader friendliness while maintaining the wealth of information contained within.

Booklet 1 summarizes the content of the four subsequent substantive booklets and presents policy implications drawn from their findings. Booklet 2 provides a global overview of the latest estimates of and trends in the supply, use and health consequences of drugs. Booklet 3 examines current estimates of and trends in the cultivation, production and consumption of the three plant-based drugs (cocaine, opiates and cannabis), reviews the latest developments in cannabis policies and provides an analysis of the global synthetic drugs market, including new psychoactive substances. Booklet 4 looks at the extent of drug use across age groups, particularly among young and older people, by reviewing the risks and vulnerabilities to drug use in young people, the health and social consequences they experience and their role in drug supply, as well as highlighting issues related to the health care needs of older people who use drugs. Finally, Booklet 5 focuses on the specific issues related to drug use among women, including the social and health consequences of drug use and access to treatment by women with drug use disorders; it also discusses the role played by women in the drug supply chain.

Like all previous editions, the *World Drug Report 2018* is aimed at improving the understanding of the world drug problem and contributing towards fostering greater international cooperation for countering its impact on health and security.

The statistical annex is published on the UNODC website:
https://www.unodc.org/wdr2018

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United Nations Office on Drugs and Crime

World Drug Report 2018
Methodology Report

Research and Trend Analysis Branch
UNODC, Vienna

UNODC
United Nations Office on Drugs and Crime

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1. Introduction

Considerable efforts have been made over the years to improve the estimates presented in the *World Drug Report,* which rely, to a large extent, on information submitted by Member States through the Annual Reports Questionnaire (ARQ). Nonetheless, challenges remain in producing such estimates because of the gaps and the varying quality in the available data. One major problem is the heterogeneity in the completeness and the time frame of data coverage in ARQs reported by Member States. Irregular reporting may result in absence of data for some years, and may also influence the reported trend in a given year. In addition, submitted questionnaires are not always comprehensive, and much of the data collected are subject to limitations and biases. These issues affect the reliability, quality and comparability of the information received.

Sources of information

Under the International Drug Conventions, Member States are formally required to provide national drug control related information annually to the 'Secretary General' of the United Nations (i.e. the Secretariat in the UNODC). For this purpose, the Commission on Narcotic Drugs in 2010 endorsed the revised Annual Reports Questionnaire (ARQ) that is sent to Member States each calendar year for submission of responses and information on the drug situation.

The World Drug Report 2018 is based on data primarily obtained from the ARQs submitted by Governments to UNODC. The data collected in the current ARQ normally refer to the drug situation in 2016. Out of 199 potential respondents to the ARQ for 2016 (including 193 Member States), UNODC received 110 replies to its questionnaire on the "Extent and patterns of and trends in drug use (ARQ Part III)" and 113 replies to Part IV on "Extent and patterns and trends in drug crop cultivation, manufacturing and trafficking". Europe, had the best coverage (87 per cent of the respondents provided a reply), followed by Asia (77 per cent) and the Americas (57 per cent). In the case of Africa, only 31 per cent of the Member States, and in the Oceania region, only two out of the 16 countries, responded to the Annual Report Questionnaire.

In general, the quantity of information provided on illicit drug supply is significantly better than that of information provided on drug demand. Analysis of responses to Part IV of the

ARQ revealed that 71 per cent of them were 'substantially' completed compared to 64 per cent of Part III (ARQs with completion rates higher than 50 per cent were classified as having been 'substantially filled in'; ARQs with completion rates lower than 50 per cent were classified as having been 'partially filled in').

In order to analyse the extent to which Member States provided information, a number of key questions in the ARQ were identified:

- For Part III, on the extent and patterns and trends of drug abuse, the key questions used for the analysis referred to: trends in drug use, for which 89 per cent of the respondents returning the ARQ provided information; prevalence of different drugs among the general population, for which 64 per cent of the respondents provided information; for prevalence of drug use among youth 59 per cent responded; for drug related mortality 57 per cent and for treatment demand 80 per cent. On average, for the countries which submitted Part III to UNODC, the overall response rate of completion was 63 per cent. However, this analysis does not take into account the completeness or quality of the information provided in response to each of the areas mentioned.

- For Part IV, on the extent and patterns and trends in drug crop cultivation, manufacturing and trafficking, the analysis included replies to the questions on: the quantities seized, for which 97 per cent of the Member States returning the ARQ provided the information; on trafficking of illicit drugs, for which 97 per cent of these Member States provided responses; on prices and purity 88 per cent of the Member States responded, and on persons brought into formal contact with the police and/or the criminal justice system in connection with drug-related offences, which 79 per cent of the Member States provided information. The overall analysis of these data revealed that 72 per cent of the Part IV responses were "substantially" completed. However this analysis does not take into account the completeness of responses of the quality of information provided in each of sections mentioned.

Information provided by Member States in the ARQ form the basis for the estimates and trend analysis provided in the World Drug Report. Often, this information and data is not sufficient to provide an accurate or comprehensive picture of the world's drug markets. When

necessary and where available, the data from the ARQ are thus supplemented with data from other sources.

As in previous years, seizure data made available to UNODC via the ARQ was complemented primarily with data from other government sources, such as other official communication with UNODC, official national publications, data provided to UNODC by the Heads of National Law Enforcement Agencies (HONLEA) at their regional meetings. and data published by international and regional organisations such as Interpol/ICPO, World Customs Organization, European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) and the Inter-American Drug Abuse Control Commission (CICAD). Price data for Europe were complemented with data from Europol. Demand related information was obtained through a number of additional sources, including the national assessments of the drug situation supported by UNODC, the drug control agencies participating in the UNODC's 'Drug Abuse Information Network for Asia and the Pacific' (DAINAP), as well as various national and regional epidemiological networks such as the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) or the Inter-American Drug Abuse Control Commission (CICAD). Reports published by National governments and academic research published in the scientific literature were also used as additional sources of information. This type of supplementary information is useful and necessary as long as Member States lack the monitoring systems necessary to produce reliable, comprehensive and internationally comparable data.

To this end, UNODC encourages and supports the improvement of national monitoring systems. Major progress has been made in the area of illicit crop monitoring over the last few years in some of the countries that have major illicit crop cultivations. In close cooperation with UNODC and with the support of major donors – these countries have developed impressive monitoring systems designed to identify the extent of, and trends in, the cultivation of narcotic plants. These data form a fundamental basis for trend analysis of illicit crop cultivation and drug production presented in the World Drug Report.

There remain significant data limitations on the demand side. Despite commendable progress made in several Member States, in the area of prevalence estimates for example, far more remains to be done to provide a truly reliable basis for trend and policy analysis and needs assessments. The work currently being done on the World Drug Report 2016 provides yet

another opportunity to emphasize the global need for improving the evidence base available to the policy makers and programme planners.

2. Data on drug use and health consequences of drug use

Overview

UNODC estimates of the extent of illicit drug use in the world have been published periodically since 1997. Assessing the extent of drug use (the prevalence and estimates of the number of drug users) is a particularly difficult undertaking because it involves in most settings measuring the size of a 'hidden' population. Regional and global estimates are reported with ranges to reflect the information gaps. The level of confidence expressed in the estimates varies across regions and drug types.

A global estimate of the level of use of a specific drug involves the following steps:

1. Identification and analysis of appropriate sources (starting from the ARQ);
2. Identification of key benchmark figures for the level of drug use in all countries where data are available (annual prevalence of drug use among the general population aged 15-64) which then serve as 'anchor points' for subsequent calculations;
3. 'Standardization' of existing data if reported with a different reference population than the one used for the *World Drug Report* (for example, from age group 12 and above to a standard age group of 15-64);
4. Adjustments of national indicators to estimate an annual prevalence rate if such a rate is not available (for example, by using the lifetime prevalence or current use rates; or lifetime or annual prevalence rates among the youth population). This includes the identification of adjustment factors based on information from countries in the region with similar cultural, social and economic situations where applicable;
5. Imputation for countries where data are not available, based on data from countries in the same subregion. Ranges are calculated by considering the 10th and 90th weighted percentile of the subregional distribution, using the target population in the countries as weights;

6. Extrapolation of available results for a subregion were calculated only for subregions where prevalence estimates for at least two countries covering at least 20% of the population were available. If, due to a lack of data, subregional estimates were not extrapolated, a regional calculation was extrapolated based on the 10th and 90th percentile of the distribution of the data available from countries in the region. For the World Drug Report 2018, this methodology was revised in favour of a weighted percentile procedure that takes into account the population aged 15-64 in the countries.

7. Aggregation of subregional estimates rolled-up into regional results to arrive at global estimates.

For countries that did not submit information through the ARQ, or in cases where the data were older than 10 years, other sources were identified, where available. In nearly all cases, these were government sources. Many estimates needed to be adjusted to improve comparability (see below).

In cases of estimates referring to previous years, the prevalence rates are unchanged and applied to new population estimates for the year 2016. Currently, only a few countries measure prevalence of drug use among the general population on an annual basis. The remaining countries that regularly measure it - typically the more economically developed - do so usually every three to five years. Therefore, caution should be used when interpreting any change in national, regional or even global prevalence figures, as changes may in part reflect newer reports from countries, at times with changed methodology, or the exclusion of older reports, rather than actual changes in prevalence of a drug type.

Detailed information on drug use is available from countries in North America, a large number of countries in Europe, a number of countries in South America, the two large countries in Oceania and a limited number of countries in Asia and Africa. For the World Drug Report 2018, new estimates of prevalence of drug use among the general population for the year 2016 were available for 22 countries, while two Member States provided data for the year 2017. One key problem in national data is the level of accuracy, which varies strongly from country to country. Not all estimates are based on sound epidemiological surveys. In some cases, the estimates simply reflect the aggregate number of drug users found in drug registries, which cover only a fraction of the total drug using population in a country. Even in

cases where detailed information is available, there is often considerable divergence in definitions used, such as chronic or regular users; registry data (people in contact with the treatment system or the judicial system) versus survey data (usually extrapolation of results obtained through interviews of a selected sample); general population versus specific surveys of groups in terms of age (such as school surveys), special settings (such as hospitals or prisons), or high risk groups, et cetera.

To reduce the error margins that arise from simply aggregating such diverse estimates, an attempt has been made to standardize - as a far as possible - the heterogeneous data set. All available estimates were transformed into one single indicator – annual prevalence among the general population aged 15 to 64 – in most instances using regional average estimates and using transformation ratios derived from analysis of the situation in neighbouring countries.. The basic assumption is that though the level of drug use differs between countries, there are general patterns (for example, young people consume more drugs than older people; males consume more drugs than females; people in contact with the criminal justice system show higher prevalence rates than the general population, et cetera) which apply to most countries. It is also assumed that the relationship between lifetime prevalence and annual prevalence among the general population or between lifetime prevalence among young people and annual prevalence among the general population, except for new or emerging drug trends, do not vary greatly among countries with similar social, cultural and economic situations.

UNODC does not publish estimates of the prevalence of drug use in countries with smaller populations (less than approximately 100,000 population aged 15-64) where the prevalence estimates were based on the results of youth or school surveys that were extrapolated to the general adult population, as applying such methods in the context of small countries can result in inaccurate figures.

Indicators

The most widely used indicator at the global level is the annual prevalence rate: the number of people who have consumed an illicit drug at least once in the twelve months prior to the study. Annual prevalence has been adopted by UNODC as one of key indicators to measure the extent of drug use. It is also part of the Lisbon Consensus on core epidemiological

indicators of drug use which has been endorsed by the Commission on Narcotic Drugs. The key epidemiological indicators of drug use are:

1. Drug consumption among the general population (prevalence and incidence);
2. Drug consumption among the youth population (prevalence and incidence);
3. High-risk drug use (number of injecting drug users and the proportion engaged in high-risk behaviour, number of daily drug users);
4. Utilization of services for drug problems (treatment demand);
5. Drug-related morbidity (prevalence of HIV, hepatitis B virus and hepatitis C virus among drug users);
6. Drug-related mortality (deaths attributable to drug use).

Efforts have been made to present the overall drug situation from countries and regions based on these key epidemiological indicators.

The use of annual prevalence is a compromise between lifetime prevalence data (drug use at least once in a lifetime) and data on current use (drug use at least once over the past month). The annual prevalence rate is usually shown as a percentage of the youth and adult population. The definitions of the age groups vary, however, from country to country. Given a highly skewed distribution of drug use among the different age cohorts in most countries, differences in the age groups can lead to substantially diverging results.

Applying different methodologies may also yield diverging results for the same country. In such cases, the sources were analysed in-depth and priority was given to the most recent data and to the methodological approaches that are considered to produce the best results. For example, it is generally accepted that nationally representative household surveys are reasonably good approaches to estimating cannabis, ATS or cocaine use among the general population, at least in countries where there are no adverse consequences for admitting illicit drug use. Thus, household survey results were usually given priority over other sources of prevalence estimates.

When it comes to the use of opiates (opium, heroin, and other illicit opiates), injecting drug use, or the use of cocaine and ATS among regular or dependent users, annual prevalence data derived from national household surveys tend to grossly under-estimate such use, because

heroin or other problem drug users often tend to be marginalized or less socially integrated, and may not be identified as living in a 'typical' household (they may be on the streets, homeless or institutionalized). Therefore, a number of 'indirect' methods have been developed to provide estimates for this group of drug users, including benchmark and multiplier methods (benchmark data may include treatment demand, police registration or arrest data, data on HIV infections, other services utilization by problem drug users or mortality data), capture-recapture methods and multivariate indicators. In countries where there was evidence that the primary 'problem drug' was opiates, and an indirect estimate existed for 'problem drug use' or injecting drug use, this was preferred over household survey estimates of heroin use. Therefore, for most of the countries, prevalence of opioid or opiates use reported refers to the extent of use of these substances measured through indirect methods.

For other drug types, priority was given to annual prevalence data found by means of household surveys. In order to generate comparable results for all countries, wherever needed, the reported data was extrapolated to annual prevalence rates and/or adjusted for the preferred age group of 15-64 for the general population.

Extrapolation methods

Adjustment for differences in age groups

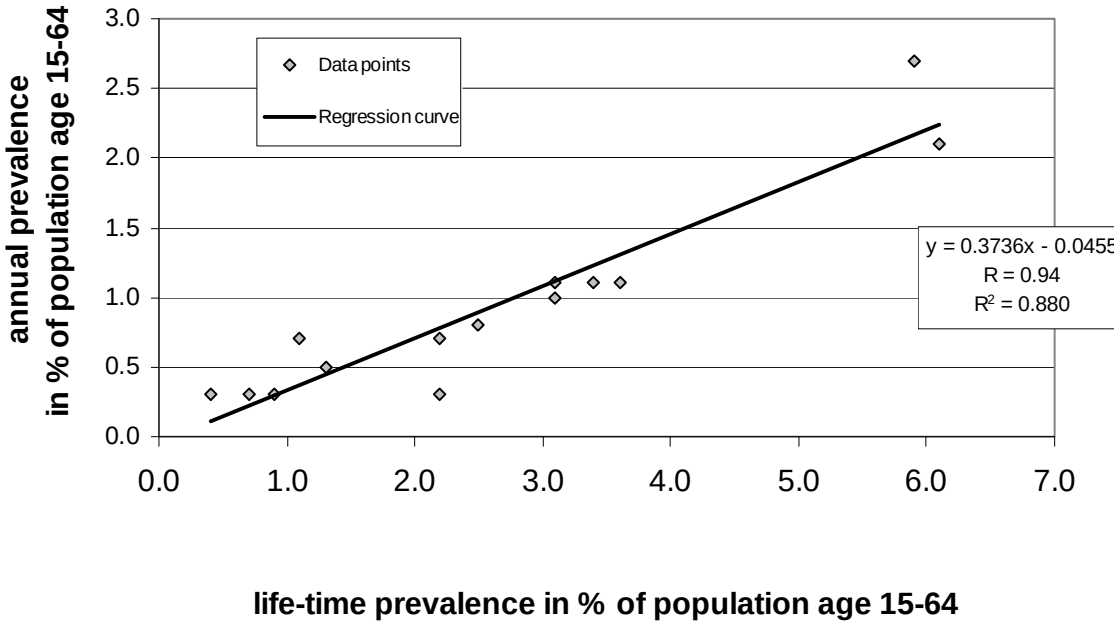
Member States are increasingly using the 15-64 age group, though other groups are used as well. Where the age groups reported by Member States did not differ significantly from 15-64, they were presented as reported, and the age group specified. Where studies were based on significantly different age groups, results were typically adjusted. A number of countries reported prevalence rates or number of drug users for the age groups 15+ or 18+. In such cases, adjustments were generally based on the assumption that there was no significant drug use above the age of 64; the reported number of drug users based on the population age 15+ (or age 18+) was shown as a proportion of the population aged 15-64.

Extrapolation of results from lifetime prevalence to annual prevalence

Some countries have conducted surveys in recent years without asking the question whether drug consumption took place over the last year. In such cases, results were extrapolated to reach annual prevalence estimates. For example, country X in West and Central Europe

reported a lifetime prevalence of cocaine use of 2%. As an example, taking data for lifetime and annual prevalence of cocaine use in countries of West and Central Europe, it can be shown that there is a strong positive correlation between the two measures (correlation coefficient R = 0.94); that is, the higher the lifetime prevalence, the higher the annual prevalence and vice versa. Based on the resulting regression line (with annual prevalence as the dependent variable and lifetime prevalence as the independent variable) it can be estimated that a country in West and Central Europe with a lifetime prevalence of 2% is likely to have an annual prevalence of around 0.7% (see figure). Almost the same result is obtained by calculating the ratio of the unweighted average of annual prevalence rates of the West and Central European countries and the unweighted average lifetime prevalence rate (0.93/2.61 = 0.356) and multiplying this ratio with the lifetime prevalence of the country concerned (2% * 0.356 = 0.7%).

Example of annual and lifetime prevalence rates of cocaine use in West and Central Europe



Sources: UNODC, Annual Reports Questionnaire Data / EMCDDA, Annual Report.

A similar approach was used to calculate the overall ratio by averaging the annual/lifetime ratios, calculated for each country. Multiplying the resulting average ratio (0.334) with the lifetime prevalence of the country concerned provides the estimate for the annual prevalence (0.387 * 2% = 0.8%). There is a close correlation observed between lifetime and annual

prevalence (and an even stronger correlation between annual prevalence and monthly prevalence). Solid results (showing small potential errors) can only be expected from extrapolations done for a country in the same region. If instead of using the West and Central European average (0.387), the ratio found in the USA was used (0.17), the estimate for a country with a lifetime prevalence of cocaine use of 2% would instead amount to 0.3% (2% * 0.17). Such an estimate is likely to be correct for a country with a drug history similar to the USA, which has had a cocaine problem for more than two decades, as opposed to West and Central Europe, where the cocaine problem is largely a phenomenon of the last decade. Therefore, data from countries in the same subregion with similar patterns in drug use were used, wherever possible, for extrapolation purposes.

Both approaches—the regression model and the ratio model—were used to determine upper and lower uncertainty range estimates calculated at a 90% confidence interval among those aged 15-64 years in the given country. The greater the range, the larger the level of uncertainty around the estimates. The range for each country is reported in the statistical annex, where available.

Extrapolations based on school surveys

Analysis of countries which have conducted both school surveys and national household surveys shows that there is, in general, a positive correlation between the two variables, particularly for cannabis, ATS and cocaine. The correlation, however, is weaker than that of lifetime and annual prevalence or current use and annual prevalence among the general population. But it is stronger than the correlation between opiate use and injecting drug use and between treatment demand and extent of drug use in the general population

These extrapolations were conducted by using the ratios between school surveys and household surveys of countries in the same region or with similar social structure where applicable. As was the case with extrapolation of results from lifetime prevalence to annual prevalence, two approaches were taken: a) the unweighted average of the ratios between school and household surveys in the comparison countries with an upper and lower uncertainty range estimate calculated at a 90% confidence interval; and b) a regression-based extrapolation, using the relationships between estimates from the other countries to predict the estimate in the country concerned, with an upper and lower uncertainty range estimate

calculated at a 90% confidence interval. The final uncertainty range and best estimate are calculated using both models, where applicable.

Extrapolations based on treatment data

For a number of developing countries, the only drug use-related data available was drug users registered or treatment demand. In such cases, other countries in the region with a similar socio-economic structure were identified, which reported annual prevalence and treatment data. A ratio of people treated per 1,000 drug users was calculated for each country. The results from different countries were then averaged and the resulting ratio was used to extrapolate the likely number of drug users from the number of people in treatment.

National, regional and global estimates of the number of people who use drugs and the health consequences of drug use

For this purpose, the estimated prevalence rates of countries were applied to the population aged 15-64, as provided by the United Nations Population Division for the year 2016.

In the tables presented in the World Drug Report for regional and global estimates, totals may not add up due to rounding.

Ranges have been produced to reflect the considerable uncertainty that arises when data are either extrapolated or imputed. Ranges are provided for estimated numbers and prevalence rates in the Report. Larger ranges are reported for subregions and regions with less certainty about the likely levels of drug use – in other words, those regions for which fewer direct estimates are available, for a comparatively smaller proportion of the region's population, or for regions for which the existing estimates show a comparatively larger variability.

Countries with one published estimate (typically those countries with a representative household survey, or an indirect prevalence estimate that did not report ranges) did not have uncertainty estimated. This estimate is reported as the 'best estimate'.

To account for populations in countries with no published estimate, the 10th and 90th percentile in the range of direct estimates within the subregion was used to produce a lower and upper estimate. For the World Drug Report 2018, for the first time a weighted percentile procedure was implemented, that takes into account the population in the 15-64 age group in

each country. For example, there are four countries in the Near and Middle East / South-West Asia subregion with sufficiently recent past year prevalence estimates for cocaine use: Afghanistan (0.00, a point estimate), Iran (Islamic Republic of) (0.00 – 0.01, best estimate 0.01), Israel (0.50 – 0.70, best estimate 0.60) and Pakistan (0.00 – 0.04, best estimate 0.01). In order to obtain a best estimate for the subregion, the weighted average of the best estimates for prevalence over these three countries is applied to the population of the remaining countries in the subregion without prevalence data. To obtain a range for the subregion, the weighted 10th percentile of the lower bounds of the uncertainty ranges (0.00, 0.00, 0.50 and 0.00), namely 0.00, and the 90th percentile of the upper bounds (0.00, 0.01, 0.70 and 0.04), namely 0.04, were considered. It is important to note that, as Israel accounts for only about 3 per cent of the population within the 15-64 age group in these four countries, the resulting weighted percentiles are not heavily influenced by the higher prevalence present in this country. The percentages of 0.00and 0.04 were applied to the population of the remaining countries without prevalence data, in combination with the national level data for Afghanistan, Iran (Islamic Republic of), Israel and Pakistan, to derive subregional lower and upper estimates of 0.01 and 0.04 per cent respectively.

In some cases, not all the regions in a subregion had sufficient country-level data to allow the above calculations. In such cases, for the purposes of arriving at estimates at regional level, lower and upper estimates at the sub-regional level were derived based on the data points from the entire region, specifically by considering the weighted 10th and 90th percentiles respectively of the lower and upper country-level estimates. These results were then combined with the other subregions to arrive at upper and lower estimates, and hence best estimates, at regional level.

This produces conservative (wide) intervals for subregions where there is geographic variation and/or variance in existing country-level estimates; but it also reduces the likelihood that skewed estimates will have a dramatic effect on regional and global figures, as the weighted percentiles procedure will give a smaller weight to relatively small countries, which tend to be more likely to present an extreme prevalence.

One exception was South Asia's subregional opiate and cannabis estimates. In this case, India's population accounts for approximately 85% of total population of the six countries in the subregion, but recent reliable estimates of drug use for India were not available. Instead of using all prevalence estimates for Asia (that is, estimates from the Near and Middle East to

East Asia) to determine India's contribution to the subregional uncertainty, it was determined that India's contribution was best reflected by its neighbouring countries.

For the World Drug Report 2018, the region of Oceania was divided into four subregions (Australia and New Zealand, Melanesia, Micronesia, and Polynesia), while in previous years no subregional estimates of annual prevalence among the population aged 15-64 were available. Given that the data for Melanesia, Micronesia and Polynesia is scarce, in order to avoid imputing these regions with data from only Australia and New Zealand, the closest five countries to these regions with available data were considered in the calculations, when necessary. This was the case for the calculations of the prevalence of cocaine, "ecstasy", opiates and opioids.

Estimates of the total number of people who used illicit drugs at least once in the past year

This year's Report used the same approach as in the previous years. Two ranges were produced, and the lowest and highest estimate of each the approaches were taken to estimate the lower and upper ranges, respectively, of the total drug using population. This estimate is obviously tentative given the limited number of countries upon which the data informing the two approaches were based. The two approaches were as follows:

Approach 1:

The global estimates of the number of people using each of the five drug groups in the past year were added up. Taking into account that people use more than one drug type and that these five populations overlap, the total was adjusted downward. The size of this adjustment was made based upon household surveys conducted in 26 countries globally including countries from North America (Canada, Mexico and the United States, Europe (including Italy, Germany, Spain and England and Wales), Latin America (Argentina, Brazil, Plurinational State of Bolivia, Chile, Peru and Uruguay), Asia and the Pacific (Israel, Indonesia, Philippines, and Australia) and Africa (Algeria), which assessed all five drug types, and reported an estimate of total illicit drug use. Across these studies, the extent to which adding each population of users over estimated the total population was a median factor of 1.12. The summed total was therefore divided by 1.12

Approach 2:

This approach was based on the average proportion of the total drug using population that comprises cannabis users. The average proportion was obtained from household surveys conducted in the same countries as for Approach 1. Across all of these studies, the median proportion of total drug users that comprised cannabis users was 81 per cent. The range of cannabis users at the global level was therefore divided by 0.813.

The global lower estimate was the lower of the two values obtained from the two approaches, while the upper estimates was the upper value derived from the two approaches described.

Estimates of the number of 'problem drug users'

It is useful to make estimates of the number of drug users whose use is particularly problematic, as a proxy to those who could be diagnosed with drug use disorders, as this subgroup of drug users is most likely to come to the attention of health and law enforcement. Moreover, this subgroup's drug use has been estimated to cause the main burden of disease and public order.

The number of problem drug users is typically estimated with the number of people with drug use disorders. Sometimes, an alternative approach is used. The EMCDDA has been using 'injecting or long duration use of opioids, amphetamines or cocaine' to guide country-level indirect prevalence estimation studies of problem drug use.

In this Report, as in previous years, each of the five range estimates of the number of people using each of the five drug groups was converted into a 'heroin user equivalent'. This was calculated with 'relative risk coefficients' (see below) derived from the UNODC Harm Index. This method enables the aggregation of results from different drugs into one reference drug.

Table: Relative risk coefficient

	Treatment index	IDU	Toxicity	Deaths index	Relative risk coefficient
		Index	Index		(average treatment, IDU, toxicity, death)
Opiates	100	100	100	100	**100**
Cocaine	85.3	47.8	88	18.5	**59.9**
Amphetamines	20.1	59.5	32	6.8	**29.6**
Ecstasy	3.8	6.1	20.7	1	**7.9**
Cannabis	9	0	1.5	0.6	**2.8**

A lower range was calculated by summing each of the five lower range estimates; the upper end of the range was calculated by summing the upper range of the five estimates.

To obtain an estimate of the number of 'problem drug users', these totals were multiplied by the corresponding proportion of past year heroin users in the United States National Survey on Drug Use and Health (range 53-68% over the recent rounds of this survey). Hence, the LOW estimate is the lower proportion (53%) multiplied by the lower estimated size of the heroin use equivalent population (31.4 million heroin user equivalents). The HIGH estimate is the higher proportion (68%) multiplied by the higher estimated size of the heroin use equivalent population (65.3 million heroin user equivalents). This gives a range of 16.7 to 44.4 million problem drug users globally.

Calculation of drug use perception indices

In addition to estimates on the extent of drug use, member states also provide UNODC with their perceptions of drug use trends. Such trends are typically based on a multitude of indicators, including general population prevalence data, school surveys, treatment data, emergency room visits, mortality data, reports by social workers, health care officials and law

enforcement officers, arrest data, seizure data, media reports, etc.. Based on this information a simple index has been created. For reports of "large increase" 2 points were allocated, for "some increase" 1 point; for "stable" 0 points; for "some decrease" 1 point was deducted and for "large decrease" 2 points were deducted. The points calculated for each year were subsequently added to the accumulated points of the previous year to arrive the drug use perception index. The year 2006 was chosen as the starting year of the index.

Results for cannabis indicate rather strong increases over the 2006-2009 period, followed by a period of only minor increases though again stronger increases in 2016.

Example of calculation of global cannabis use perception trend index:

	Points*	Cannabis use perception index (accumulated points; 2006 =100)
2006	45	0
2007	45	45
2008	30	75
2009	36	111
2010	16	127
2011	4	131
2012	9	140
2013	19	159
2014	22	181
2015	15	196
2016	30	226

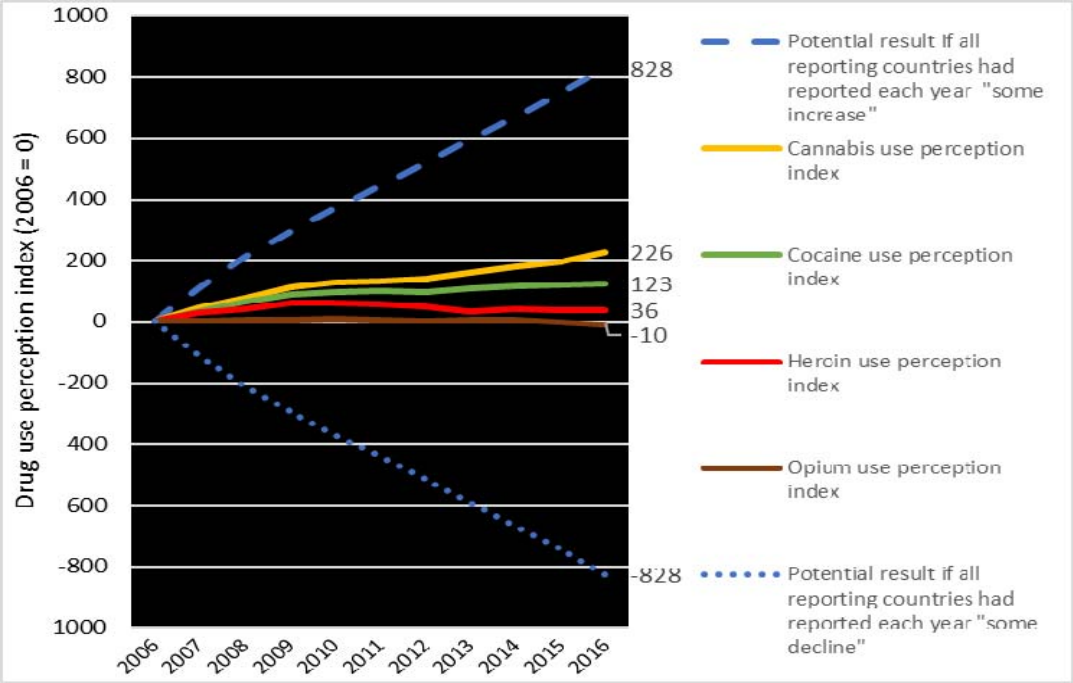
Points allocated per country:

* "large increase": 2 points; " some increase": 1 point; "stable": 0; "some decrease": 1 point; "large decline": 2 points

The calculated cannabis use perception index – with a base year of 0 in 2006 - reached 226 points by 2016, the cocaine use perception index 123 points, the heroin use perception index 36 points while the opium use perception use fell by 10 points until 2016. These index numbers suggest that cannabis, cocaine and heroin use increased while opium use declined slightly over the 2006-2016 period.

On average close to 83 countries per year reported drug use trends over the 2007-2016 period to UNODC. If all reporting countries had seen each year a stable situation the drug use perception index would have remained unchanged at 0; if all reporting countries had seen "some increase', the index would have reached 828 points by 2016 (for a drug) and in case all reporting countries had seen 'large increases' the index would have attained 1,656 points by 2016 (for a drug).

Drug use perception index for cannabis, cocaine, heroin and opium, 2006-2016



Source: UNODC, annual report questionnaire data.

Calculation of regional and global estimates of cannabis use among 15-16 years old students

UNODC undertook in the World Drug Report – for the first time ever – an estimate of the annual prevalence of cannabis use among 15-16 years old students, based on available data from 130 countries.

Cannabis was selected as in most countries cannabis is the drug most widely used, both among the general population and among youth. For instance, data from the Monitoring the Future studies suggested that cannabis users among 10th grade students (typically aged 15-16) accounted for 92 per cent of all drug users in this age group in 2017. Similarly, the the European School Survey Project on Alcohol and Other Drugs (ESPAD) studies suggested that cannabis users in Europe accounted for 93 per cent of all drug users in 2015.

The age group "15-16 years" was chosen as this is the "preferred" age group for "youth" that is asked in UNODC's annual report questionnaire. This age group was also chosen by ESPAD which regularly provides data from some 35 European countries on drug and alcohol use. This age group is also available from the surveys among 10th graders undertaken annually under the Monitoring the Future project in the United States, funded by the National Institute on Drug Abuse (NIDA), and from a number of other countries.

Cannabis use prevalence rates typically increase with age until around 18-20 years before declining again thereafter with age. This also means that for most countries cannabis use prevalence rates among 15-16 years old students turn out to be rather similar to the broader group of students aged 12-18 (with those aged 12-14 showing lower rates and those aged 17-18 showing higher rates). Thus, for the United States the annual cannabis use prevalence rates amongst 10th graders turn out to be very similar to those found amongst 8th, 10th and 12th graders combined. Similarly, in Colombia annual prevalence of cannabis use amongst 12 to 18 years old students was found to have been very similar to the rates found among 15-16 years old students. The same applies to students in Pakistan as well. Cannabis use prevalence rates among students aged 15-16 are thus reasonably good proxies for cannabis use among the overall student population aged 12-18. They are thus the preferred indicator for measuring student drug use at the international level as is also reflected in the question on student drug use in UNODC's annual report questionnaire.

The methodology chosen to calculate the global average of cannabis use among students aged 15-16 years was very similar to the methodology used to calculate cannabis use among the general population aged 15-64:

1. Listing – on a sub-regional basis – the latest annual prevalence rates of cannabis use among the population aged 15-16 (which in most cases reflected school surveys) and multiplying such percentages with the average population of those aged 15-16 in those countries in 2016.

2. For the remaining countries that reported prevalence data on cannabis use (but not the requested age group of not annual prevalence the following adjustments/extrapolations were done:

    a. Adjusting surveys using different age groups to a likely estimate for the population aged 15-16 years; the age adjustments were done based on detailed data from the United Stated for countries in North America, Europe and the developed countries of the Oceania region (i.e. Australia and New Zealand); for Africa and Asia based on detailed data available from Pakistan and for South America, Central America and the Caribbean based on detailed data available from Colombia.

    A special model was developed for the adjustments. In short, taking into account considerations of diversity and representativity, the following data served as benchmarks for the calculation of the conversion ratios: the 2013 survey in Colombia among people aged 12-65[1], the 2012 survey carried out in Pakistan jointly by UNODC and the Government of Pakistan targeting the population aged 15-64[2] and the 2015 National Survey on Drug Use and Health of the United States among people aged 12 years and older[3]. After collating or generating prevalence data broken down by age groups, prevalence data were derived for each single-year age group. In cases where robust data were not available at this level of granularity (e.g. prevalence data

[1] *Gobierno Nacional de la República de Colombia, Estudio Nacional de Consumo de Sustancias Psicoactivas en Colombia – 2013.*
[2] UNODC, *Drug Use in Pakistan 2013.*
[3] Data query engine at http://pdas.samhsa.gov/ and *Substance Abuse and Mental Health Services Administration, Results from the 2015 National Survey on Drug and Health: Detailed Tables*.

available only for the age brackets 15-19, 20-24, 25-29, etc.), the prevalence in single-year age groups was estimated by optimizing for smoothness the prevalence data as a function of age - subject to the constraints that the total number of users within each given age bracket remained unchanged (i.e. equal to the prevalence multiplied by the population within the specific age bracket). Where necessary boundary conditions were imposed, e.g. a prevalence of 0 for ages 10 and below. On the basis of single-year prevalence estimates obtained, the prevalence rates were estimated for each possible age group that could potentially arise (e.g. 10-15, 12-19, 14-22). Finally, the conversion factors were calculated as the ratios of the prevalence data within the respective age groups as compared to the age groups of interest (age 15-16 years).

b. Extrapolating available life-time or past month data of cannabis use from individual countries to (missing) annual prevalence data based on a regression analysis of other countries in the subregion providing both life-time and annual data among youth or both past month and annual data among youth. A 95 per cent confidence interval was then used to calculate, in addition, a minimum and a maximum estimate based on such regression data.

3. For the remaining countries which did not report any prevalence data it was assumed that – on average – they had similar prevalence rates as the population weighted average of the reporting countries in the subregion. In cases where the reporting countries accounted for less than 20 per cent of the total population of the subregion, the (weighted) average of reporting countries in the region as a whole was used instead.

4. For countries not reporting any prevalence data it was assumed that the lower estimate was equivalent to the (population weighted) 10^{th} percentile of the reporting countries in the subregion (or the region if reporting countries in the subregion accounted for less than 20 per cent of total population in the subregion) while the upper estimate was equivalent to the (population weighted) 90^{th} percentile of the reporting countries in the subregion (or the data for the region was used as a proxy if reporting countries in the subregion accounted for less than 20 per cent of the total population in the subregion).

The reported ranges reflected primarily the coverage of a region by student surveys; in short, the larger the reported error margins, the less countries reported school survey data in a region or sub-region to UNODC. Error margins turned out to be small for Europe and the Americas where a majority of countries undertook such school surveys in recent years while they were rather large for Africa, Asia or for the Oceania region (with the exception of the economically advanced countries in this region).

5. The totals of the calculated subregional estimates gave the regional estimates and the total of the regional estimates then gave the global estimates.

6. The number of cannabis users was shown for a hypothetical average age of 15-16 years; in order to calculate the total number of cannabis users of those aged 15 years and 16 years the totals had to be still multiplied by two (in order to be in line with the approach used to show general population estimates for those aged 15-64)

The analysis of drug consumption based on the analysis of waste-water is an alternative method to estimate drug consumption.

The development of analytical tools and methods for the waste-water analysis took place in recent years in Europe by waste-water research institutes under the umbrella of the COST initiative (Sewage Analysis CORe group Europe under the European Cooperation in Science and Technology initiative), supported by the European Union under the EU Framework Programme Horizon 2020. Both EU and non-EU countries participate in this cooperation.

In order to obtain – as far as possible – comparable data, waste-water in various cities has been analysed by the research institutes participating in the COST exercise over a one week period each year in spring. The amount of benzoylecgonine found each day in the waste-water was determined and a daily average was calculated. (This is important as cocaine use is typically more widespread during the weekend than during normal weak days). In a subsequent step the size of the population responsible for the waste-water in the respective waste-water catchment areas was determined and the results were shown in terms of average milligrams of benzoylecgonine (a main cocaine metabolite) per day found in waste-water per 1000 inhabitants.

The waste-water data used for the analysis in the World Drug Report can be found under:

http://www.emcdda.europa.eu/topics/pods/waste-water-analysis#panel2 as well as under

http://score-cost.eu/wp-content/uploads/sites/118/2018/03/SCORE_monitoring_final_2017_v8.pdf

Even though the results from the analysis of waste-water have been obtained applying high levels of scientific rigour, the subsequent analysis of the trends at the European level has remained a challenge due to the fact that different cities across Europe took part in this exercise in different years over the 2011-2017 period and differences of cocaine consumption across European cities continue to be quite significant. This means that the inclusion or the exclusion of a specific city can have a significant impact on the overall average. In other words, calculating and comparing the averages of the cities participating each year in the survey may lead to misleading results as a growing participation of cities with lower levels of cocaine consumption could well offset increases in overall cocaine consumption.

This problem can be overcome by analysing the results of the cities which participated each year in this exercise. The time series for each city were then weighted by the population in the respective catchment areas to calculate the overall average. Such an analysis would show a strong increase over the 2011-2017 period (65 per cent). However, such results would be based on the results of just 11 cities and the data from these cities are not necessarily a reliable indicator for overall cocaine consumption trends in Europe.

An alternative approach used and shown in the report was to expand the analysis (with a respective 95 per cent confidence interval) to 99 European cities participating in at least one year in the study analysing bencoylecgonine in waste-water (including 19 cities in 2011, 23 in 2012, 42 in 2014, 53 in 2015, 57 in 2016 and 60 in 2017). UNODC included in its calculations only cities that were geographically located within Europe, i.e. not included were cities being part of European countries that were located outside of Europe.[4]

Interpolation techniques were then used to account for missing data. First data from the 99 cities were entered as reported from individual cities. In case of data gaps between years it was assumed that there was a gradual increase or decline in per capita results between the two

[4]Overall (i.e. including cities located overseas and including cities which did not analyse the benzoylecgonine content of waste-water) 19 cities participated in waste-water analysis in 2011, 23 in 2012, 42 in 2013, 50 in 2014, 57 in 2015, 58 in 2015 and 66 in 2017. The number of countries participating in the COST exercise rose from 11 in in 2011 to 23 in 2017; the population covered by the waste-water treatment plants that were analysed increased from 14 million in 2011 to 36 million in 2017. (SCORE, Waste-Water Monitoring Data 2011-2017, http://score-cost.eu/monitoring2017/)

data points (using the Excel function Series, Trend, Growth). In case of missing data at the beginning or at the end of the data series, the latest reported data (from other years) was used to fill the data gaps. This method should have helped to reduce the bias due to the reporting of additional cities (or the non-reporting of other cities) in specific years while making better use of reported data, thus reducing potential trend distortions. In order to calculate a European average, the city results were weighted by the respective population living in the respective waste-water catchment areas. Based on this method the consumption of cocaine in Europe appears to have increased by 52 per cent over the 2011-2017 period, from 197 mg of benzoylecgonine per day found in waste-water per 1,000 inhabitants in 2011 to 300 mg of benzoylecgonine per day found in waste-water per 1,000 inhabitants in 2017.

This increase is – probably - still a conservative estimate for the actual rise as the model used assumes no changes after the latest reported data (i.e. using 2016 data as a proxy for 2017 data if the latter were not reported).

The method of interpolations used for calculting the averages is shown below based on a hypothetical example of data from four cities:

Hypothetical sample: data of benzoylecgonine per 1000 inhabitants in four cities

	2011	2012	2013	2014	2015	2016	2017
City A	80	78	75	80	92		95
City B		55	60			85	90
City C	150	154			174	180	
City D	140			115	120	125	127

Interpolation method* used for dealing with missing data for calculating the averages

	2011	2012	2013	2014	2015	2016	2017
City A	80	78	75	80	92	93	95
City B	55	55	60	67	76	85	90
City C	150	154	160	167	174	180	180
City D	140	131	123	115	120	125	127

*using Excel growth function for filling in data within a time series and assuming no change after latest year available

Reported population living in waste-water catchment areas in cities A, B, C, D

	2011	2012	2013	2014	2015	2016	2017
City A	120,000	125,000	126,000	128,000	130,000		
City B		210,000	215,000			220,000	225,000
City C	60,000	65,000			75,000	77,000	
City D	150,000			170,000	175,000	177,000	180,000

Interpolation method* used for estimating population living in waste-water catchment areas in cities A, B, C, D

	2011	2012	2013	2014	2015	2016	2017
City A	120,000	125,000	126,000	128,000	130,000	130,000	130,000
City B	210,000	210,000	215,000	216,654	218,321	220,000	225,000
City C	60,000	65,000	68,176	71,506	75,000	77,000	77,000
City D	150,000	156,391	163,053	170,000	175,000	177,000	180,000

*using Excel growth function for filling in data within a time series and assuming no change after latest year available

Based on these data the population weighted averages were calculated for the four cities. The calculation was done in Excel, using for each year the sumproduct function for benzoylecgonine found in the four cities and the population in the four catchment areas; the resulting total was then divided by the total population in the four waste-water catchment areas in the respective year to arrive at the average (i.e. for 2017: (95*130,000+90*225,000 +180*77,000+127*180,000) / (130,000+225,000+77,000+180,000) = 113).

Calculation of average of benzoylecgonine per 1000 inhabitants in four cities

	2011	2012	2013	2014	2015	2016	2017
Average for cities A, B, C, D	**95**	**93**	**95**	**98**	**105**	**110**	**113**

Estimates of the prevalence of injecting drug use, HIV and hepatitis (C and B virus) among people who inject drugs (PWID)

Data sources, selection of country estimates and validation process

Population size estimates for PWID, and the prevalence of HIV and hepatitis among PWID, were identified over the past five years using a comprehensive search of the published peer-reviewed literature, a search of the "grey" literature, from the official United Nations survey instruments of UNODC and UNAIDS, from regional organizations (particularly the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA)), and through the global network of UNODC HIV/AIDS Advisors.

The criteria for the selection of country estimates primarily involved the consideration of the methodological soundness of the estimates, determined according to the classification presented in the table below (studies in class A are of higher methodological quality and those in class D of lower quality), with due regard to national geographic coverage, the year of the estimate, and the definition of the target population (global and regional estimates were made for the annual prevalence of injecting among both genders aged 15-64). UNODC, WHO, UNAIDS and the World Bank reviewed all estimates.

Table: Classification of methodology for people who inject drugs, and those among them living with HIV and hepatitis

Data are categorized by methodology according to a slightly modified classification originally proposed in Mathers et. al. (2008) Lancet paper.[5]

Class	*Data on people who inject drugs*
A	Indirect prevalence estimation methods e.g., capture-recapture, network scale-up method, multiplier methods, etc
B1	Mapping/census and enumeration
B2	General population survey
C	Treatment and other national registers of drug users
D1	· Official government estimate with no methodology reported · Experts' judgment with known method of estimation (eg. an estimate obtained through a rapid assessment) · Modelling studies (e.g. Spectrum) · Delphi method or other consensus estimate
D2*	Estimate from non-official source with methodology unknown

Class	*Data on the prevalence of HIV and hepatitis among people who inject drugs*
A	Seroprevalence study
A1	Multi-site seroprevalence study with at least two sample types (e.g. treatment or outreach sample)
A2	Seroprevalence study from a single sample type
B	Registration or notification of cases of HIV infection (e.g. from treatment services)
C	Prevalence study using self-reported HIV
D1	· Official government estimate with no methodology reported · Modelling Studies (e.g. mode of transmission models)
D2*	Estimate from non-official source with methodology unknown

* Data graded D2 are excluded from the dataset

As part of a wider review process, every year since 2014, UNODC, WHO, UNAIDS and the World Bank have reached out to a broad group of experts from academia (including all former members of the Reference Group to the United Nations on HIV and Injecting Drug Use) and regional, international, including civil society, organizations to ensure that a scientific approach to the methodology was used and that the greatest number of datasets available worldwide on the subject were included. Data were sent to Member States annually for their validation and potential comments on the selected estimates, or for completion of data if surveys had been conducted which UNODC was not aware of.

[5] Mathers, B., L. Degenhardt, et al. (2008). Global epidemiology of injecting drug use and HIV among people who inject drugs: a systematic review. *The Lancet* 372(9651): 1733-1745

Calculation of regional and global estimates

Regional and global estimates were calculated for a specific reference year. Presently this is for 2016 (as for most of the data presented in the World Drug Report 2018).

The regional best estimates for the prevalence of injecting drug use, and HIV and hepatitis among PWID, were calculated as the population-weighted means. The global estimates for 2016 were calculated as the population-weighted regional means. In the population-weighting procedure, the population refers to those aged 15-64 years for the year 2016 in the case of the prevalence of injecting drug use, or to the estimated number of PWID for the year 2016 in the case of the prevalence of HIV and hepatitis among PWID. For countries where a number of PWID was reported in the study/survey, a prevalence estimate was subsequently calculated using the population aged 15-64 corresponding to the year of the estimate. For those countries where an estimate of the prevalence of HIV or hepatitis among PWID was available, but a population size estimate for PWID was not, then the regional average prevalence of injecting drug use was used to produce a population size estimate for PWID that was used in the weighting procedure for the prevalence of HIV and hepatitis among PWID.

Uncertainty intervals for the regional and global best estimates were calculated that reflect both the range in the country prevalence estimates (if these were provided) and the regional variability in the available country prevalence estimates. To achieve this, the 10th and 90th percentiles of the known prevalence estimates for countries from within the same region were determined. These were then applied to countries from within the same region for which no estimates were available to give a range of plausible population size estimates. This produced a liberal uncertainty range while excluding the extreme prevalence estimates.

Data quality of estimates on injecting drug use and HIV among PWID

Interpretation of regional and global estimates

The global and regional estimates for the prevalence of injecting drug use and HIV among PWID presented for 2016 in the *World Drug Report* should be viewed as an update to those presented in previous editions of the *World Drug Report* that reflect the latest data available. This year new or updated information was identified on PWID from 30 countries and on HIV

among PWID from 36 countries. There is no intention to imply that there has been an actual change in the prevalence of injecting drug use or HIV among PWID at the regional or global level. The new values represent an update based on the best estimates that can currently be made using the most recent and highest quality data available to UNODC, WHO, UNAIDS, and the World Bank.

Quality of national-level data on PWID

Of the 107 countries with information on the prevalence of PWID, 63 per cent were of high methodological quality (class A, as defined in the table above) and 69 per cent related to timely data from 2012 or more recently. Almost one-half (42 per cent) of the countries have information that is from recent, methodologically high quality surveys. With a low level of coverage of the population aged 15-64 compared to other regions there is limited information on PWID for countries in Africa. It is noticeable that there are relatively few recent, methodologically high quality data from the Americas. However, for the two sub-regions with the highest prevalence of PWID (Eastern and South-Eastern Europe, and Central Asia and Transcaucasia) there is a very high percentage data coverage of the populations aged 15-64 and more than half of the estimates are both recent and of high methodological quality.

Quality of national-level data on HIV among PWID

Of the 119 countries with information on the prevalence of HIV among PWID, 70 per cent were of high methodological quality (class A, as defined in the table above) and 58 per cent related to timely data from 2014 or more recently. More than one third (38 per cent) of the countries have information that is from both recent and methodologically high quality surveys. The two sub-regions that have by far the highest prevalence of HIV among PWID (South-West Asia, and Eastern and South-Eastern Europe) have prevalence estimates from all countries and from methodologically high quality surveys from a good percentage of those countries.

UNODC
United Nations Office on Drugs and Crime

Table: Population coverage, timeliness and methodological quality of information from the 107 countries with data on people who inject drugs

Region	*Subregion*	*Percentage coverage in terms of population aged 15-64 years*	*Percentage coverage in terms of countries*	*Of countries with available estimates*		
				Percentage with recent data (2012 or more recent)	*Percentage with high methodological quality (class A)*	*Percentage with both recent and high methodological quality (class A)*
Africa		**58**	**36**	**75**	**45**	**30**
America		**85**	**26**	**69**	**23**	**15**
	North America	100	100	67	33	0
	Latin America and the Caribbean	71	21	70	20	20
Asia		**94**	**65**	**75**	**66**	**50**
	Central Asia and Transcaucasia	94	88	57	100	57
	East and South-East Asia	95	68	85	46	46
	South-West Asia	100	100	100	100	100
	Near and Middle East	17	31	75	25	25
	South Asia	100	83	60	80	40
Europe		**100**	**82**	**61**	**80**	**46**
	Eastern and South-Eastern Europe	100	100	62	85	54
	Western and Central Europe	100	76	61	79	43
Oceania		**73**	**8**	**100**	**100**	**100**
Global		**88**	**47**	**69**	**63**	**42**

Sources for original estimates on PWID: UNODC annual report questionnaire, progress reports of UNAIDS on the global AIDS response (various years), the former Reference Group to the United Nations on HIV and Injecting Drug Use, peer-reviewed journal articles, study/survey reports and national government reports.

Table: Population coverage, timeliness and methodological quality of information from the 119 countries with data on the prevalence of HIV among people who inject drugs

Region	*Subregion*	*Percentage coverage in terms of estimated number of people who inject drugs*	*Percentage coverage in terms of countries*	*Of countries with available estimates*		
				Percentage with recent data (2014 or more recent)	*Percentage with high methodological quality (class A)*	*Percentage with both recent and high methodological quality (class A)*
Africa		**76**	**43**	**50**	**88**	**42**
America		**93**	**28**	**21**	**64**	**21**
	North America	100	100	33	100	33
	Latin America and the Caribbean	73	23	18	55	18
Asia		**95**	**78**	**68**	**76**	**53**
	Central Asia and Transcaucasia	94	88	71	100	71
	East and South-East Asia	96	74	71	71	50
	South-West Asia	100	100	67	100	67
	Near and Middle East	56	69	56	44	22
	South Asia	100	83	80	100	80
Europe		**100**	**82**	**64**	**55**	**26**
	Eastern and South-Eastern Europe	100	100	46	69	23
	Western and Central Europe	100	76	72	48	28
Oceania		**73**	**8**	**50**	**100**	**50**
Global		**94**	**52**	**58**	**70**	**38**

Sources for original estimates on HIV among PWID: UNODC annual report questionnaire, progress reports of UNAIDS on the global AIDS response (various years), the former Reference Group to the United Nations on HIV and Injecting Drug Use, peer-reviewed journal articles, study/survey reports and national government reports.

Estimates on the number of drug-related deaths (mortality)

Deaths caused by drug use can be directly related to drug use disorders, such as overdoses, or can be indirectly related to drug use, such as from HIV/AIDS or hepatitis C acquired through unsafe injecting practices.

It is important to note that Member States report on drug-related deaths according to their own definitions and therefore caution should be taken when making country comparisons. The total number of drug-related deaths reported by Member States was used to determine a mortality rate per 1 million population aged 15-64 years.

3. Drug cultivation, production and manufacture

Data on cultivation of opium poppy and coca bush and production of opium and coca leaf for the main producing countries (Afghanistan, Myanmar and the Lao People's Democratic Republic, for opium; and Colombia, Peru and the Plurinational State of Bolivia for coca) are mainly derived from national monitoring systems supported by UNODC in the framework of the Global Illicit Crop Monitoring Programme (ICMP). The detailed country reports can be found on the UNODC website https://www.unodc.org/unodc/en/crop-monitoring/index.html

UNODC estimates for Afghanistan cover the period 1994-2016. UNDOC supported monitoring systems in most other countries started following UNGASS 1998, became operational over the 2000-2002 period and have reported data ever since. Opium cultivation and production estimates are available up to the year 2017.

The preliminary opium poppy cultivation data for 2016 have been revised as new information from missing countries became available and some country results were revised. The total area under opium poppy cultivation for the year 2016 thus increased marginally, from 304,800 hectares reported in the 2017 World Drug Report, to 305,300 hectares reported in the 2018 World Drug Report.

Preliminary data for 2017 – 418,000 hectares - should be interpreted with caution as they are less robust than data published in previous years. No opium poppy surveys took place in 2017

in the Lao PDR, and the survey conducted in Myanmar did not cover the entire national territory. Work for the estimation of opium poppy cultivation in Mexico for the seasons 2015/2016 and 2016/2017 is still ongoing, and poppy crop estimate figures for these periods will become available soon. Data published for Mexico up until the year 2014 have been based on estimates provided by the US State Department in its annual International Narcotics Control Strategy Report (INCSR) and are – for methodological reasons – not directly comparable with the new estimates from the new Mexican crop monitoring system (supported by UNODC).

Opium poppy cultivation in countries which do not conduct area surveys, was estimated with an indirect method (see below). The global opium poppy cultivation estimates for 2017 will be adjusted again in next year's World Drug Report once more data will have become available.

Preliminary estimates suggest that global opium production in 2017 amounted to some 10,500 tons, the highest such figure since UNODC started its annual monitoring of opium production at the beginning of the 21st century. Earlier estimates exist, but a comparison of opium poppy cultivation and opium production estimates with estimates from previous decades, notably those reported for periods prior to World War II are rendered difficult as the methodologies then used differ from the methodologies used nowadays. Opium production estimates are nowadays derived from an analysis of satellite photos for the analysis of the area under cultivation. This area is then multiplied with the respective yields of opium per hectare found in specific regions, as derived from detailed yield surveys. In contrast, opium production estimates at the turn of the 19th to the 20th century were mainly derived from a detailed analysis of tax payments and other levies of opium poppy farmers to the authorities.

Such global opium production estimates reported in the proceedings of the Shanghai Opium Commission, 1909, revealed e.g. a global opium production of 41,600 tons of opium for the period 1906/07.[6] For the year 1934 official reports by the League of Nations saw a global opium production of some 16,600 tons.[7]

Comparisons are further complicated by the fact that the legal status of opium production was not always clear in the 19th century and the early decades of the 20th century, i.e. data

[6] UNODC, A Century of International Drug Control, 2009), based on data reported by the International Opium Commission (Report of the International Opium Commission, Shanghai, China), Feb. 1909.
[7] UNODC, A Century of International Drug Control, 2009.

reported usually comprised both legal and illegal production of opium. Thus, long-term comparisons should be made with estimates for legal and illegal opium production combined. In addition to illegal production of some 10,500 tons in 2017, legal production of opium in 2017 amounted to – based on preliminary estimates by the International Narcotics Control Board - some 466 tons (produced on some 11,140 ha). Thus, in total close to 11,000 tons of opium were produced in 2017. However, this calculation does not take into account that much of the licit source of morphine production nowadays is in the form of poppy straw rather than in the form of opium as such. The next question is how best to convert such poppy straw data into opium equivalents. One possibility is to calculate the morphine produced out of the poppy straw and to find out how much opium would have been needed to produce such amounts of morphine. The International Narcotics Control Board reported for 2016 a global licit production of 39,052 tons of poppy straw for the extraction of morphine, and an actual production of 347.5 tons of morphine out of 48,447 tons of poppy straw (including poppy straw produced in previous years). (No estimates for 2017 are, as year, available). With a morphine content of, on average 11.7 per cent found in 2016, the poppy straw used for the manufacture of morphine in that year may have been equivalent to some 2,970 tons of opium (with the actual output of morphine produced in 2016 out of the 2016 harvest being slightly smaller). Thus, in total illegal and legal opium production may have amounted to some 15,000 tons (10,500 tons illicit + 466 tons of licit opium + 2,970 tons of poppy straw expressed in licit opium equivalents = 14,936 tons). Such licit and illicit opium production would be still less than the licit and illicit opium production reported for the year 1906/07 (41,600 tons of opium) or the year 1934 (16,600 tons) even though direct comparability remains limited due to changes in the methodologies used.

Coca cultivation estimates in the three main Andean coca producing countries were available – at the time of drafting the World Drug Report - up to the year 2016. Results for the year 2017 will be published on UNODC's website as soon as the new reports will have been released in the summer months of 2018.

Estimates of cannabis cultivation in 2009, 2010, 2011 and 2012 in Afghanistan, as well as cannabis cultivation in 2003, 2004 and 2005 in Morocco, were also produced by the UNODC-supported national monitoring systems and can be found on the UNODC website. Estimates for other countries were drawn from ARQ replies and various other sources,

including reports from Governments, UNODC field offices and the United States Department of State's Bureau for International Narcotics and Law Enforcement Affairs.

A full technical description of the methods used by UNODC-supported national monitoring systems can be found in the respective national survey reports available at https://www.unodc.org/unodc/en/crop-monitoring/index.html

Net cultivation

Not all the fields on which illicit crops are planted are actually harvested and contribute to drug production. For Afghanistan, a system of monitoring opium poppy eradication is in place which provides all necessary information to calculate the net cultivation area. In Myanmar and the Lao People's Democratic Republic, only the area of opium poppy eradicated before the annual opium survey is taken into account for the estimation of the cultivation area. Not enough information is available to consider eradication carried out after the time of the annual opium survey.

A major difference between coca and other narcotic plants such as opium poppy and cannabis is that the coca bush is a perennial plant which can be harvested several times per year. This longevity of the coca plant should, in principle, make it easier to measure the area under coca cultivation. In reality, the area under coca cultivation is dynamic, making it difficult to determine the exact amount of land under coca cultivation at any specific point in time or within a given year. There are several reasons why coca cultivation is so dynamic, including new plantation, abandonment, reactivation of previously abandoned fields, manual eradication and aerial spraying.[8]

The issue of different area concepts and data sources used to monitor illicit coca bush cultivation was repeatedly investigated by UNODC.[9] To improve the comparability of estimates between countries and years, since 2011 net coca cultivation area at 31 of December is presented not only for Colombia but also for Peru. For technical reasons, the initial area measurement of coca fields takes place on satellite images acquired at different dates of the year and sometimes having different technical specifications. For the

[8] Plant disease and pests are not considered here as their impact is likely to be captured in the coca leaf yield estimates.
[9] See World Drug Report 2011, p. 262.

Plurinational State of Bolivia, in contrast, most satellite images are taken close to the 31 of December in order to reduce potential errors linked to subsequent eradication. In any case, for the Bolivian and Peruvian estimate, these differences are considered to have a limited effect only, whereas the dynamic situation in Colombia requires more adjustments to maintain year-on-year comparability. For more details, please see the country specific reports.

Indirect estimation of illicit opium poppy cultivation

Eradication and plant seizure reports indicate that illicit opium poppy cultivation exists in many countries, which do not regularly conduct illicit crop surveys. Starting 2008 a new methodology was introduced to estimate the extent of this illicit cultivation with an indirect method based on two indicators available in UNODC's databases: eradicated poppy area and opium poppy (plant, capsule) seizures reported as units or weight.

Prioritization of data sources: Whenever possible, the eradicated poppy area was used as this indicator is conceptually closest. If this indicator was not available, poppy plant seizure data was used, which requires an additional conversion of the seized amount into area eradicated. It can be assumed that plant seizures are often a different way of recording eradication. e.g. in cases where area measurements are technically difficult or because the law requires all seized material to be weighed even if the seizure consists actually of eradicated plants on a field. Large-scale or long-distance illicit trade with opium poppy plants is unlikely as the plants are bulky, perishable and of low value.

Eradication factor: Evidence from countries which provide both illicit cultivation and eradication data indicates that illicit cultivation is typically a multiple of the area eradicated. This relationship, averaged over the last five years for which information is available, was used to calculate a factor which allowed to estimate illicit cultivation in countries from eradication figures. Since 2008, this factor is based on opium poppy cultivation and eradication data from Colombia, Lao People's Republic, Mexico, Myanmar, Pakistan and Thailand. Over the years, the average over these five countries ranged between 2.1 and 3.0 (eradicated area * factor = net cultivation area). (Afghanistan was not considered for the calculation of the factor as the objective was to estimate low to mid-levels of illicit

cultivation. Afghanistan, representing two thirds or more of global illicit poppy cultivation, clearly fell outside this range).

Plant seizures: seizures of poppy plant material usually happen close to the source, i.e. in vicinity of the cultivated area. The data available to UNODC does not allow to accurately and systematically differentiate between the various parts (capsules, bulbs, entire plants) of the plant seized as for plant seizures. Most (roots, stem, leaves, capsules) or only some parts (poppy straw, capsules only) of the plant may be seized. While this does not influence seizure data given in plant units, it plays a role when interpreting seizure data given as weight

Plant seizure data in units represent plant numbers, which can be converted into area (ha) using an average number of opium poppy plants per hectare. Yield measurements from Afghanistan and Myanmar, where UNODC has conducted yield surveys over several years, indicate an average figure of about 190,000 plants per hectare. Dividing poppy plant seizure numbers by this factor results in estimate of the area on which the seized material was cultivated. This is equivalent to eradicated area, as the seized material was taken out of the production cycle. Eradicated area multiplied with the eradication factor described above yields then cultivation area.

Plant seizure data reported as weight: In order to convert the weight of seized poppy plants into area, a typical biomass per hectare of poppy was estimated based on the evaluation of various sources. The biomass yield in oven-dry equivalent including stem, leaves, capsule and seeds reported by a commercial licit opium poppy grower in Spain[10] was 2,800 kg/ha for rain-fed and 7,800 kg/ha for irrigated fields respectively. Information on the weight of roots was not available. Loewe[11] found biomass yields between 3,921 kg/ha to 5,438 kg/ha in trial cultivation under greenhouse conditions. Acock et al.[12] found oven-dry plant weights of about 37 grams including roots in trials under controlled conditions corresponding to a biomass yield of around 7,000 kg/ha with the assumed plant density of 190,000/ha. Among the available biomass measurements only the figures from Spain referred to poppy grown under field conditions. All other results fell into the range between the non-irrigated and irrigated

[10] Personal communication, 2010, from Alcaliber company.
[11] Personal communication, 2010, see also Loewe, A. (2010). Remote Sensing based Monitoring of Opium Cultivation in Afghanistan. Philosophische Fakultaet. Bonn, Rheinische Friedrich-Wilhelms-Universitaet**:** 106.
[12] Acock, M. C., R. C. Pausch, et al. (1997). "Growth and development of opium poppy (Papaver Somniferum L.) as a function of temperature." Biotronics **26**: 47-57.

biomass yields (2,800 – 7,800 kg/ha) reported. For purposes of this calculation the simple average of these two values was taken.

Two caveats have to be made: a) As the reporting format does not differentiate between capsules and plants or between the different growth stages of a poppy plant, it was assumed that the reported weight refers to whole, mature plants. This leads to a conservative estimate as many plant seizures are actually carried out on fields before the poppy plants reach maturity. b) The reference biomass measurements from scientific studies are expressed in oven-dried equivalents, whereas the reported weights could refer to fresh weight or air-dry weight; both of which are higher than the oven-dry equivalent weight equivalent. This would lead to an over-estimation of the illicit cultivation area. In the case of young plants, which are typically fresh but not yet fully grown, both errors could balance off, whereas in the case of mature or harvested plants, which tend to be drier, both errors would be smaller.

In order to avoid the fluctuations typically present in seizure and eradication data, the above calculations were based on plant seizures averaged over the most recent five-year period, rather than datapoints relative to the specific year. If no eradication or plant seizure was reported in that period, no value was calculated.

Yield[13] and production

To estimate potential production of opium, coca leaf and cannabis (herb and resin), the number of harvests per year and the total yield of primary plant material has to be established. The UNODC-supported national surveys take measurements in the field and conduct interviews with farmers, using results from both to produce the final data on yield.

Opium yield surveys are complex. Harvesting opium with the traditional lancing method can take up to two weeks as the opium latex that oozes out of the poppy capsule has to dry before harvesters can scrape it off and several lancings take place until the plant has dried. To avoid this lengthy process, yield surveyors measure the number of poppy capsules and their size in sample plots. Using a scientifically developed formula, the measured poppy capsule volume indicates how much opium gum each plant potentially yields. Thus, the per hectare opium

[13] Further information on the methodology of opium and coca leaf yield surveys conducted by UNODC can be found in United Nations (2001): *Guidelines for Yield Assessment of Opium Gum and Coca Leaf from Brief Field Visits*, New York (ST/NAR/33).

yield can be estimated. Different formulas were developed for South-East and South-West Asia. In Afghanistan, yield surveys are carried out annually; in Myanmar regularly.

For coca bush, the number of harvests varies, as does the yield per harvest. In the Plurinational State of Bolivia and Peru, UNODC supports monitoring systems that conduct coca leaf yield surveys in several regions, by harvesting sample plots of coca fields over the course of a year, at points in time indicated by the coca farmer. In these two countries, yield surveys are carried out only occasionally, due to the difficult security situation in many coca regions and because of funding constraints. In Colombia, coca leaf yield estimates are updated yearly through a rotational monitoring system introduced in 2005 that ensures that every yield region is revisited about every three years. However, as the security situation does not allow for surveyors to return to the sample fields, only one harvest is measured, and the others are estimated based on information from the farmer. In 2013 for the first time the concept of productive area was applied to calculate the coca leaf yields in Colombia, taking into account the dynamics of the fields due to spraying and eradication for which some fields are only partly productive during the year. This new way of calculating was retroactively applied to the results of 2005-2012, giving slightly different results than published before [14]. In Peru and Bolivia the additional production of partly productive areas is not considered for the coca leaf yield estimates.[15]

Conversion factors

The primary plant material harvested - opium in the form of gum or latex from opium poppy, coca leaves from coca bush, and the cannabis plant - undergo a sequence of extraction and transformation processes, some of which are done by farmers onsite, others by traffickers in clandestine laboratories. Some of these processes involve precursor chemicals and may be done by different people in different places under a variety of conditions, which are not always known. In the case of opium gum, for example, traffickers extract the morphine contained in the gum in one process, transform the morphine into heroin base in a second process, and finally produce heroin hydrochloride. In the case of cocaine, coca paste is

[14] More information on the results of the methodology used can be found in the report on coca cultivation in Colombia for 2013 (UNODC/ Government of Colombia, June 2014) available on the internet at http://www.unodc.org/unodc/en/crop-monitoring/index.html.
[15] In 2013 a correction factor was applied for the time that fields in Peru were productive during the year, however this approach was abolished as of 2014 due to incomplete eradication data. More information about the 2013 calculation to be found at page 73 of the Peru coca cultivation survey report for 2013 available on the internet at http://www.unodc.org/unodc/en/crop-monitoring/index.html.

produced from either sun-dried (in the Plurinational State of Bolivia and Peru) or fresh coca leaves (in Colombia), which is later transformed into cocaine base, from where cocaine hydrochloride is produced.

The results of each step, for example from coca leaf to coca paste, can be estimated with a conversion factor. Such conversion factors are based on interviews with the people involved in the process, such as farmers in Colombia, who report how much coca leaf they need to produce 1 kg of coca paste or cocaine base. Tests have also been conducted where so-called 'cooks' or 'chemists' demonstrate how they do the processing under local conditions. A number of studies conducted by enforcement agencies in the main drug-producing countries have provided the orders of magnitude for the transformation from the raw material to the end product. This information is usually based on just a few case studies, however, which are not necessarily representative of the entire production process. Farmer interviews are not always possible due to the sensitivity of the topic, especially if the processing is done by specialists and not by the farmers themselves. Establishing conversion ratios is complicated by the fact that traffickers may not know the quality of the raw material and chemicals they use, which may vary considerably; they may have to use a range of chemicals for the same purpose depending, on their availability and costs; and the conditions under which the processing takes place (temperature, humidity, et cetera) differ.

It is important to take into account the fact that the margins of error of these conversion ratios – used to calculate the potential cocaine production from coca leaf or the heroin production from opium - are not known. To be precise, these calculations would require detailed information on the morphine content of opium or the cocaine content of the coca leaf, as well as detailed information on the efficiency of clandestine laboratories. Such information is limited. This also applies to the question of the psychoactive content of the narcotic plants.

UNODC, in cooperation with Member States, continues to review coca leaf to cocaine conversion ratios as well as coca leaf yields and net productive area estimates.[16] More research is needed to establish comparable data for all components of the cocaine production estimate.

[16] More detailed information on the ongoing review of conversion factors was presented in the 2010 *World Drug Report*, p.251 ff.

Many cannabis farmers in Afghanistan and Morocco conduct the first processing steps themselves, either by removing the upper leaves and flowers of the plant to produce cannabis herb or by threshing and sieving the plant material to extract the cannabis resin. The herb and resin yield per hectare can be obtained by multiplying the plant material yield with an extraction factor. The complex area of cannabis resin yield in Afghanistan was investigated in 2009, 2010, 2011 and 2012. The yield study included observation of the actual production of resin, which is a process of threshing and sieving the dried cannabis plants. In Morocco, this factor was established by using information from farmers on the methods used and on results from scientific laboratories. Information on the yield was obtained from interviews with cannabis farmers.[17] Given the high level of uncertainty and the continuing lack of information for the large majority of cannabis-cultivating countries, the estimates of global cannabis herb and resin production have not been calculated

Potential production

'Potential' heroin or cocaine production refers to total production of heroin or cocaine if all the cultivated opium or coca leaf, less the opium and coca leaf consumed as such, were transformed into the end products in the respective producer country in the same year. It should be noted though that a product such as opium can be stored for extended periods of time and be converted into intermediate or final products long after the harvest year. Thus 'actual' heroin manufacture, making use of accumulated stocks of opium from previous years, can deviate significantly from 'potential' heroin manufacture out of the opium produced in a specific year. Direct consumption of opium or the coca leaf, in contrast, is being taken into account. For example, consumption of coca leaf considered licit in the Plurinational State of Bolivia and Peru is deducted from the amounts of coca available for the transformation into cocaine. Other factors, such as the actual amount of illicit coca paste or opium consumption and storage, are difficult to estimate and were not taken into account. Similarly, opium consumed in Afghanistan and neighbouring countries is deducted from the amounts of opium available for heroin production. In contrast, opium stocked or opium used from stocks accumulated over previous years is not considered in the calculation of 'potential' heroin manufacture.

[17] For greater detail on studies with cannabis farmers, see: UNODC, *Enquête sur le cannabis au Maroc 2005*, Vienna, 2007.

For **cocaine**, potential production of 100% pure cocaine is estimated. In reality, clandestine laboratories do not produce 100% pure cocaine but cocaine of lower purity which is often referred to as 'export quality'.

For **heroin**, two conversion ratios are used. Apart from Afghanistan, not enough information is available to estimate the production of heroin of 100% purity. Instead, potential production of export quality heroin is estimated, whose exact purity is not known and may vary. For Afghanistan, the calculations are more detailed, here the share of all opium converted to heroin is estimated and a specific conversion ratio is applied, which uses an estimated purity for heroin of export quality.

Although it is based on current knowledge on the alkaloid content of narcotic plants and the efficiency of clandestine laboratories, it should be noted that 'potential production' is a hypothetical concept and is not an estimate of actual heroin or cocaine production at the country or global level. The concept of potential production is also different from the theoretical maximum amount of drug that could be produced if all alkaloids were extracted from opium and coca leaf. The difference between the theoretical maximum and the potential production is expressed by the so-called laboratory efficiency, which describes which proportion of alkaloids present in plant material clandestine laboratories are actually able to extract.

Colombia

From 2013 onwards, the yearly productive areas were estimated, instead of using the average area under coca cultivation of the reporting year and the previous year (the approach used in previous reports). In addition, a different conversion factor for estimating cocaine base was applied. Both the adjustment of the productive area estimate and the estimation of the conversion factor for cocaine base were retroactively applied to the results of 2009-2012, and in this year's World Drug Report also for the period 2006-2008 giving slightly different results than published before.[18]

Peru

[18] More information on the results of the two approaches and the methodology used can be found in annex 3 of the report on coca cultivation in Colombia for 2013 (UNODC/ Government of Colombia, June 2014) available on the internet at http://www.unodc.org/unodc/en/crop-monitoring/index.html and in UNODC and Gobierno de Colombia, *Colombia, Monitoreo de territorios afectados por cultivos ilícitos 2015*, July 2016, available on the internet at: https://www.unodc.org/documents/crop-monitoring/Colombia/Monitoreo_Cultivos_ilicitos_2015.pdf .

Potential cocaine production in Peru is estimated from potential coca leaf production and after deducting the amount of coca leaf estimated to be used for traditional purposes according to Government sources (9,000 mt of sun-dry coca leaf).

The Plurinational State of Bolivia

Potential cocaine production in the Plurinational State of Bolivia is estimated from potential coca leaf production after deducting the amount of coca leaf produced on 12,000 ha in the Yungas of La Paz where coca cultivation is authorized under national law.

"Old" versus "new" conversion ratios for cocaine

In order to estimate cocaine production from the area under coca cultivation, the coca leaf yield per region is estimated based on yield studies as well as – based on experiments in the field - the coca-leaf to coca-paste conversion, the coca-paste to cocaine base conversion and the cocaine-base to cocaine hydrochloride conversion. The results are then adjusted to show an overall conversion ratio from coca leaf to (a potential) 100 per cent pure cocaine hydrochloride.

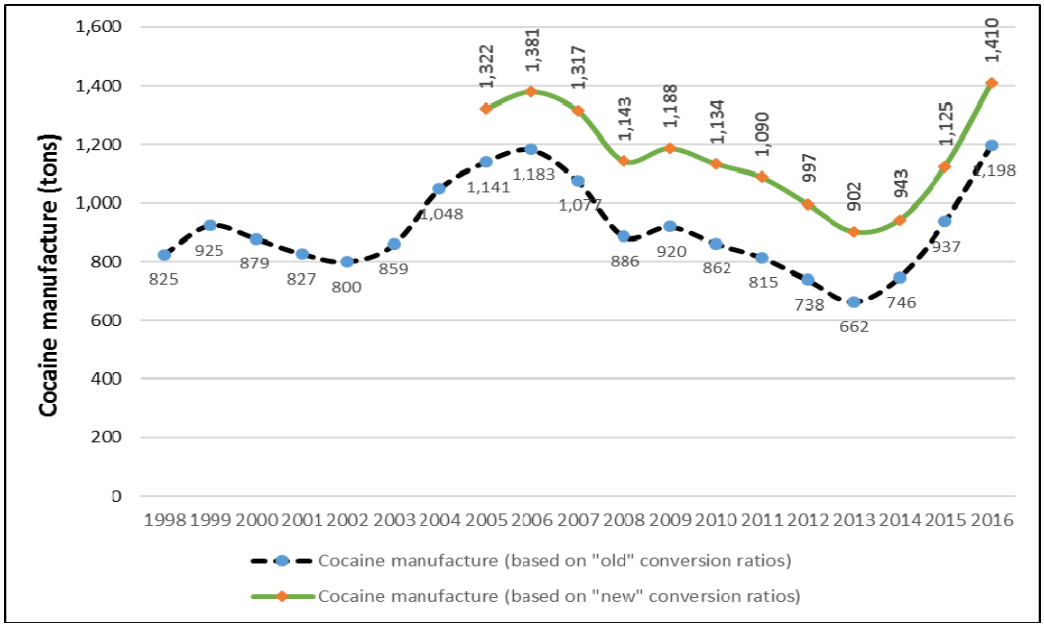
In this report the 'old' conversion ratios from coca leaf to cocaine hydrochloride are based on studies conducted by the United States Drug Enforcement Administration (DEA) in the Andean region in the 1990s. The ratios for Colombia – in close cooperation with the Colombian authorities - were updated in 2004 and are part of the 'old' conversion ratio series.

In subsequent years the DEA undertook new studies in Peru (2005) and in the Plurinational State of Bolivia (2007-2008), following indications that the laboratory efficiency in these countries may have improved. The 'new' conversion rates used in this report – for the years 2006-2016 – however, have not been reconfirmed so far in national studies as funds for such studies have not been forthcoming. For this reason, cocaine production data are not shown separately for Peru and the Plurinational State of Bolivia; only the global total based on the 'new' conversion ratio is shown. The calculations of cocaine production based on the "new" conversion ratios refer to the "new" coca leaf to cocaine hydrochloride transformation ratios found by the DEA for Colombia, Peru and the Plurinational State of Bolivia and the updated ratios for Colombia. It should be noted that the 'new' conversion ratios are still temporary; they will be updated as soon as new data, jointly established between the respective Member

States and UNODC will become available (for more details, see World Drug Report 2010 (United Nations publication, Sales No. E.10.XI.13, pp. 251 and 252).

As a result of some ex-post adjustments done in Colombia (see above), global cocaine manufacture estimates also have slightly changed for the years 2006-2008 as compared to data published in previous World Drug Reports.

Global cocaine manufacture in tons, 1998-2016



Source: UNODC, Coca cultivation surveys in the Andean countries, 2016 and previous years.

4. Drug trafficking

Seizures

The analysis presented in this report is mainly derived from the ARQ responses from Member States up to the 2016 reporting year. Including information from other sources, UNODC was able to obtain seizure data from 128 countries and territories for 2016. Over the 2011-2016 period seizures from in total 161 countries and territories were obtained. Seizures are thus the most comprehensive indicator of the drug situation and its evolution at the global level. Although seizures may not always reflect trafficking trends correctly at the national level, they tend to show reasonable representations of trends at the regional and global levels.

Seizures are reported in volume terms as well as in terms of the number of seizure cases. The analysis of seizure cases enables a direct comparison of data across drug categories. Reporting of seizure cases is, however, less comprehensive. A total of 69 countries and territories reported seizure cases to UNODC in 2016, or 103 countries and territories over the 2011-2016 period.

Countries reporting seizures of drug in volume terms may report seizures using a variety of units, primarily by weight (kg) but also in litres, tablets, doses, blotters, capsules, ampoules, et cetera. When reporting about individual countries in individual years, UNODC endeavours to be as faithful as possible to the reports received, but often it is necessary to aggregate data of different types for the purposes of comparison. For the aggregation, conversion factors are used to convert the quantities into 'kilogram equivalents' (or 'ton equivalents'). UNODC continues to record and report the disaggregated raw data, which are available in the seizure listings published at: http://www.unodc.org/unodc/en/data-and-analysis/WDR.html In these tables, seizure quantities are reproduced as reported. In the rest of the Report, seizure data are often aggregated and transformed into this unique unit of measurement. Moreover, at some points in the analysis, purity adjustments are made where relevant and where the availability of data allows.

The conversion factors affect seizure totals of amphetamine-type stimulants (ATS), as a significant share of seizures of these drug types is reported in terms of the number of tablets. Apart from seizures of ATS tablets, drug seizures are mainly reported to UNODC by weight, and sometimes by volume. This includes seizures of ATS which are not seized in tablet form (for example, ATS in powder, crystalline or liquid form) as well as seizures of other drug types, such as heroin and cocaine. Moreover, ATS seizures made in tablet form are also sometimes reported by weight, and in some cases, the reported total aggregated weight possibly includes ATS seized in different forms. Reports of seizures by weight usually refer to the bulk weight of seizures, including adulterants and diluents, rather than the amount of controlled substance only. Moreover, given the availability of data, accurate purity adjustments for bulk seizure totals in individual countries are feasible in only a minority of cases, as they would require information on purity on a case by case basis or statistically calibrated data, such as a weighted average or a distribution. The bulk weight of tablets is easier to obtain and less variable.

To ensure the comparability of seizure totals across different years and countries, UNODC uses conversion factors for ATS tablets intended to reflect the bulk weight of the tablets rather than the amount of controlled substance. The factors used in this edition of the *World Drug Report* are based on available forensic studies and range between 90 mg and 300 mg, depending on the region and the drug type, and also apply to other units which are presumed to represent a single consumption unit (dose). The table below lists the factors used for ATS, by type and region. The conversion factors remain subject to revision as the information available to UNODC improves.

Weight of tablets in milligrams

	Ecstasy (MDMA or analogue)	Amphetamine	Methamphetamine	Prescription stimulants	Other stimulants	Non-specified amphetamines
Africa	271	250	250	250	250	250
Asia (excluding Near and Middle East/ South-West Asia)	300	250	90	250	250	250
Europe	271	253	225	250	250	250
Central and South America and Caribbean	271	250	250	250	250	250
Near and Middle East/ South-West Asia	237	170	250	250	250	250
North America	250	250	250	250	250	250
Oceania	276	250	250	250	250	250

For the other drug types, the weight of a 'typical consumption unit' was assumed to be: for cannabis herb, 500 mg; for cannabis resin, 135 mg; cocaine and morphine, 100 mg; heroin, 30 mg; LSD, 0.05 mg (50 micrograms); and opium, 300 mg. For opiate seizures (unless specified differently in the text), it was assumed that 10 kg of opium were equivalent to 1 kg of morphine or heroin. Though these transformation ratios can be disputed, they provide a means of combining the different seizure reports into one comprehensive measure. The transformation ratios have been derived from those normally used by law enforcement agencies, in the scientific literature and by the International Narcotics Control Board, and were established in consultation with UNODC's Laboratory and Scientific Section. As in previous editions of the World Drug Report, seizures quantified by volume (litres) are aggregated using a conversion ratio of 1 kilogram per litre, which applies to all drug types. Cannabis plants are assumed to have an average weight of 100 grams.

Trafficking routes and volumes

Information of trafficking routes was mainly obtained from analyses of reports by Member States in the annual report questionnaire and in individual drug seizures reported to UNODC, as well as analyses of trafficking routes reported by Member States.

Individual drug seizures would be the ideal data source for any in-depth analysis of drug flows. Unfortunately, reporting of individual drug seizure cases is very uneven. A total of just 42 countries reported individual drug seizures to UNODC in 2016 (104 over the 2011-2016 period). For most drug categories, reported individual drug seizures only account for a small proportion of global seizures (as reported to UNODC in the annual report questionnaire).

Information for the maps was thus – primarily – based on information contained in the annual reports questionnaire. First of all, seizures made in the various regions over the 2012-2016 period were used as a proxy for the importance of drug trafficking activities. Subsequently, such seizures were distributed according to the countries of origin, departure and transit mentioned by countries in the various regions for the period 2012-2016 (outside of the regions analysed). This served as a basis for the calculation of (likely) importance of the various trafficking flows. Such calculations, for instance, revealed that the "Balkan route" continued being the main heroin trafficking route worldwide while trafficking of cocaine was predominantly from the Andean region to North America (notably the United States), primarily via the Pacific Ocean, followed by trafficking of cocaine along the Atlantic from the Andean region to Europe, mostly directly with smaller amounts also being trafficked via Africa, notably via countries of Western Africa. Similar calculations also showed that for methamphetamine – in contrast to heroin or cocaine – intra-regional trafficking (notably within North America and within East and South-East Asia) dominated overall trafficking activities. Inter-regional trafficking was in this case of only secondary importance. At the same time, this approach also allowed the identification of several newly emerging trafficking routes for heroin, cocaine and methamphetamine in the various regions in recent years.

Drug price and purity data

Price and purity data, if properly collected and reported, can be powerful indicators of market trends. Trends in supply can change over a shorter period of time when compared with changes in demand and shifts in prices and purities are relatively good indicators for

increases or declines of market supply. Research has shown that short-term changes in the consumer markets are first reflected in purity changes while prices tend to be rather stable over longer periods of time. UNODC collects its price data from the ARQ, and supplements this data with other sources such as DAINAP, EMCDDA and Government reports. Prices are collected at farm-gate level, wholesale level ('kilogram prices') and at retail level ('gram prices'). Countries are asked to provide minimum, maximum and typical prices and purities. When countries do not provide typical prices/purities, for the purposes of certain estimates, the mid-point of these estimates is calculated as a proxy for the 'typical' prices/purities (unless scientific studies are available which provide better estimates). What is generally not known is how data were collected and how reliable it is. Although improvements have been made in some countries over the years, a number of law enforcement bodies have not yet established a regular system for collecting purity and price data.

Prices are collected in local currency or in the currency in which the transactions take place and are then converted by UNODC into US dollars for the purposes of comparability among countries. The conversion into US dollars is based on official UN rates of exchange for the year. If comparisons of prices, expressed in US dollars are made over different years it should be noted that changes in such prices may be also influenced by changes in the exchange rates and may not necessarily reflect changes in the local markets.

Standardized prices of cocaine and heroin in the United States and Western Europe

Some of the figures presented in Table 7.5 available in http://www.unodc.org/unodc/en/data-and-analysis/WDR.html can follow a different methodology than the one described above.

For the case of heroin and cocaine prices in the 17 European countries in this Table, the published prices correspond an average of the available prices for the specific year (e.g., "crack" and cocaine salts, or white and brown heroin), if more than one type of drug is reported, or the typical value if only one price is reported by the country. In order to properly calculate the weighted averages across the 17 European Member States, in those countries for which no data is available, a "best estimate" is reported. This "best estimate" is based on: a) the latest reported value, b) an interpolation between two reported values, or c) the midpoint between the reported low and high observed prices (when a typical value is not available).

In order to properly reflect the prices faced by the population within these 17 countries, the average prices are weighted by the population. A reported average price per gram in Euro is

also published based on the average exchange rates for the corresponding year, and the reported units (gram for retail, kilogram for wholesale). Finally, the inflation-adjusted weighted average is expressed in 2016 Euro, by deflating the prices using the Consumer Price Index (CPI) published by Eurostat.

For the case of heroin and cocaine average prices at the retail level in the United States of America, given the lack of availability of a reported typical price, the published figures up to 2012 are based on ARQ data and data from ONDCP, *2015 National Drug Control Strategy - 2015 Data Supplement*. The average prices for the 2013-2016 period are based on the annual trends observed in individual case data published by the DEA in their STRIDE database[19]. A trimmed mean for all transactions of 10 grams or less in the database in each specific year is used.

In the calculation of purity adjusted average heroin prices, a constant purity is used from 2013 and onwards, while data available through the ARQ or published in ONDCP, *2015 National Drug Control Strategy - 2015 Data Supplement* are used for previous years. In the calculation of purity adjusted cocaine prices, data from ONDCP is also used up to the year 2012, while data published by the DEA is used for the 2013-2016 period[20].

Inflation adjusted prices in the United States were deflated using the CPI, published by the Bureau of Labor Statistics.

[19] https://www.dea.gov/resource-center/stride-data.shtml
[20] DEA, *Drug Threat Assessment 2017*, October 2017. Figure 89.